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Melting and Pouring Aluminum Alloys

Proper Care of Furnace—Effect of Melting and Pouring Temperatures on Castings—How To Overcome Foundry Difficulties

FROM SALES DEPARTMENT CONDENSED DATA PREPARED BY THE TECHNICAL DEPARTMENT, ALUMINUM COMPANY OF AMERICA

WHEN the peculiarities are mastered, foundry work in aluminum is very satisfactory due to its response to constant manipulation. Among the peculiarities to be considered, the effect of melting and pouring temperatures upon the casting is of greatest importance. The necessity for careful temperature control at all stages of the melting and pouring process cannot be over-emphasized, for disregard of temperature regulation undoubtedly is one of the most prolific causes of foundry troubles. Experience has shown that melting and pouring temperatures of the metal influence the physical properties and structures of a casting to an almost unbelievable extent. Aluminum should preferably be melted in ordinary plumbago crucibles, and, if not overheated, it will absorb no appreciable amount of silicon from the crucible. Aluminum remelted twenty times in such a crucible showed an addition of only one-tenth of one per cent of silicon. Nor does aluminum unite with carbon to any considerable extent when heated in contact with it, unless the metal is heated much above its melting point. However, plumbago crucibles are short-lived and, consequently, expensive. They are also not very well suited to large-scale foundry work. As a result, cast-iron pots are probably more generally used for remelting purposes. If the iron pots are well cared for there is no danger of an excessively large amount of iron being taken up by the metal.

As a matter of fact, the furnace must be carefully attended if the metal is not to be contaminated. After each heat, or at the end of the day, if a continuous heat is run, the crucible or pot should be thoroughly cleaned. The interior of the crucible should then be covered with a carbon wash. The iron pot should be given a plumbago wash followed by a lime wash. These coatings serve as a protection against the action of the molten metal, and their importance will be more clearly seen in the subsequent treatment of foundry troubles.

Gas and oil are the best fuels for remelting aluminum because their use gives the best possible control over the temperature in the furnace. Coke is also used.

No charcoal or carbonaceous covering should be used on aluminum, because the charcoal is liable to become incorporated in the metal and find its way into the casting. A better way to prevent oxidation is to prevent overheating of the metal by means of accurate temperature control.

The charge should be stirred frequently in order to thoroughly disseminate the alloying metal through the aluminum. It should not be allowed to remain long on the fire after the metal is thoroughly fused and mixed, for it has been found that the longer any metal is held in the furnace the more unsound are the resultant castings, regardless of the melting and pouring temperatures. Before being removed from the furnace and again in the ladle just before pouring, the metal should be carefully skimmed. As stated before, aluminum oxidizes rapidly and consequently has considerable dross on it. Unless great care is exercised in removing this dross, it may become immersed in the body of metal and pass into the casting with the consequent poor results.

The mold should be poured slowly and carefully; otherwise, the thinner sections of the mold may not be filled; and also, the mold may wash, incorporating sand in the casting. When the casting is machined or polished the grains of the sand drop out leaving small pinholes in the surface of the metal. In order to prevent cracking the casting should be stripped as soon as it has set.

Fluxes are not generally used in good aluminum foundry practice. A flux is not needed with virgin aluminum or alloys because of their freedom from impurities and oxides. However, when scrap metal, particularly in the form of borings and turnings, is remelted a zinc chloride flux may often be used to advantage in order to increase the amount of metal recovered. The flux serves to promote union by removing the coating of oxide which surrounds each small piece of metal.

Alloys of the same chemical composition melted and cast under different temperature conditions display markedly different characteristics. A realization of this accounts for the fact that most progressive foundries are now pouring all aluminum castings under strict

THE PHYSICAL properties and casting structure are affected by the melting and pouring temperatures and require accurate temperature control in foundry work. Excessive oxidation and gas absorption are the results of overheating aluminum alloys.

Temperature regulation and better care of remelting receptacles diminish hard spots and harmful high iron content.

Checking and drawing are eliminated by softer cores, larger gating and fillets, risers or chills, uniform ladle temperature as well as better casting designs.

pyrometric control. A reliable pyrometer today is considered an absolute necessity in every up-to-date foundry. Good practice favors keeping the temperature of the metal during melting at a point but slightly above its melting point by control of the furnace heat or continuous addition of solid metal. At no time should this temperature exceed the pouring temperature except just previous to pouring, when it may be raised sufficiently to allow for the cooling which takes place during the time the metal is being removed from the furnace, skimmed and carried to the molds.

The reason for this is the excessive oxidation of aluminum at high temperatures. In as much as aluminum has a great affinity for oxygen of the air, its oxidation can never be entirely prevented, but it can always be maintained at a minimum by keeping the temperature of the charge low. Regardless of the thoroughness with which the metal is skimmed, if it has been overheated, excess oxides will become incorporated in the metal producing unsound and weak castings. Another reason why the charge should not be overheated is the tendency toward gas absorption at high temperatures.

However, should the charge become overheated in spite of frequent use of the pyrometer, the harmful effects of overheating may be minimized by the exercise of care in cooling the metal down. The charge should never be violently disturbed while in this state. The metal to be added, instead of being thrown into the charge, should be taken up with a pair of tongs and quietly stirred in the center of it. Care should be taken not to touch the sides of the crucible or pot, for this may chip the protective coating and expose the vessel to the intensified action of the metal at this temperature, introducing "hard spots" in the casting.

Some founders claim that the melting temperature is not so important provided the metal is poured at the right temperature. This is a serious error, for experience shows that the higher the temperature to which the charge is heated, the more unsound are the castings, irrespective of the pouring temperature.

Pouring Temperature and Tensile Strength

The following paragraph embodies most important suggestions for the foundryman, and is especially commended to his careful consideration:

The metal should be poured at the lowest possible temperature consistent with sufficient fluidity to completely fill the mold and at the same time allow air bubbles and gases to escape from the metal before it solidifies. This temperature will vary with the type of casting. A small thin casting must be poured hotter than a large thick one. Pouring the metal too cold causes cold shots, blow holes and lack of sharpness in the finished casting. Pouring the metal too hot causes low tensile strength, coarse grained and porous structure, rough surface, blow holes and very often shrinkage cracks.

The influence of the pouring temperature on the tensile strength of the metal is illustrated in certain tests made by H. W. Gillett. He obtained the following results from an experiment conducted to determine the relation between the pouring temperature and the tensile strength of No. 12 alloy:

Pouring Temperature In Degrees, Fahrenheit	Tensile Strength In Lb. Per Square Inch	Pouring Temperature in Degrees, Fahrenheit	Tensile Strength In Lb. Per Square Inch
1,200	20,000	1,450	17,800
1,250	19,500	1,500	17,500
1,350	18,500	1,550	17,000
1,400	18,000	1,600	16,000

It will be noticed that the tensile strength decreases as the pouring temperature increases. The explanation for this is that metal poured at a high temperature requires more time to solidify than the same kind of metal poured at a low temperature. Slow crystallization allows the crystals formed to increase in size, and large crystal growth means weak castings. The finer the grain, the stronger the metal. The rate of solidifying is also influenced by the size and thickness of the castings and by the heat conductivity of the mold. But as neither of these are entirely subject to the control of the foundryman, he is chiefly concerned with seeing that the metal is never poured at a higher temperature than is absolutely necessary for the casting in question.

Melting No. 12 Alloy

Though the practice of making No. 12 alloy in small heats by melting down the virgin aluminum and copper is not a good one, in emergencies it is sometimes resorted to by foundrymen. When this is done, certain precautions must be taken in introducing the copper into the aluminum. Because of its high melting point copper is usually introduced in the form of a rich copper alloy or hardener containing 50 per cent copper and 50 per cent aluminum, the melting point of which is lower than that of pure aluminum.

This alloy is made by melting down pure copper in one crucible and an equal amount of pure aluminum in another. When both metals are thoroughly melted the molten copper is poured into the molten aluminum. The union of the two metals produces a rise in temperature, and it has been found to be a good practice instead of melting down all of the aluminum at first to reserve a part of it and add it in the solid form at this time to offset the rise. The two metals should then be thoroughly mixed either by pouring the metal from one vessel to the other, or by stirring. The metal should be cast in the form of convenient ingots. The resulting alloy is very brittle, an ingot breaking readily on being dropped to the floor. This is an advantage in weighing out small quantities of the alloy to add to the metal.

The introduction of this alloy into the pure aluminum is easily done because of its low melting point. In order to obtain 8 per cent copper in the resulting alloy, 84 parts of pure aluminum to 16 parts of the 50-50 rich copper alloy are used. The pure aluminum is melted down first and then the alloy is added. The mixture should be thoroughly stirred to insure complete dissemination of the copper throughout the alloy. Although the alloy is now ready to pour into castings, a better practice is to cast the metal in ingot form and remelt later. The remelting gives the aluminum a better chance to form a uniform alloy with the copper.

Hard Spots from Overheating

Hard spots are small pieces of a small flint-like foreign substance in the casting which readily take the edge off any machining tool. They have their origin primarily in the plumbago crucibles or iron pots used in remelting the alloys in the foundry. In the plumbago crucibles the molten aluminum attacks the clay, reducing the silica to silicon to some extent, and permitting small pieces of the graphite to become dislodged and fall into the metal. Under the high heat of the furnace, these pieces are baked to a consistency closely resembling that of corundum, and find their way into the casting, forming hard spots. In cast-iron pots the action of the aluminum on the iron forms a hard ferro-

aluminum alloy. Pieces of this alloy break off, become incorporated in the metal and are cast with it. It has been found, however, that hard spots from this source are never so hard as those formed in plumbago crucibles.

The formation of these hard spots is increased by overheating the metal, for the action of aluminum on the crucible or pot is intensified at higher temperatures. Failure to clean the remelting receptacles frequently and to cover them with a protective wash also provides conditions favorable to their formation. In order to prevent hard spots care must be exercised in every step of the remelting process. Attention to no one detail will eliminate them entirely. Thus, though it may be said their remedy lies principally in the better care of the remelting receptacles and proper temperature control, no absolute assurance can be given that they may not develop from other sources.

The following suggestions have proved helpful where trouble from hard spots has arisen:

(1) Clean the plumbago crucibles or iron pots after each heat or at the end of each day.

(2) Give the plumbago crucibles a carbon wash and the iron pots a plumbago wash followed by a lime wash at the end of each day.

(3) Never overheat the metal. Use a good pyrometer.

(4) Discard remelting pots and crucibles before they get too old.

(5) Remelt skulls from discarded pots and crucibles separately so as not to contaminate the good metal.

(6) Skim the metal well before pouring. Then let it become quiet before dipping.

(7) Never dip near the bottom of the pot or crucible in removing metal. Hard spots, being heavy, sink to the bottom of the pot.

(8) For the same reason, never drain the pot except after each heat or at the end of the day when the metal in the bottom of the pot should be cast in ingot form and used later for low-grade casting work.

Checking and Drawing

Checking and drawing of castings may be caused by cores that are too hard, overheated metal, improper gating or uneven shrinkage of different sections of the casting. The importance of making the cores as soft as is consistent with safe handling has been emphasized before. If cores offer any resistance to the metal on contraction, especially when the metal is in its hot short state, a cracked casting is almost sure to result.

Drawing of the metal due to improper gating is a frequent occurrence. A porous, spongy appearance is often seen below the place at which the gate joins the casting, especially if this be at a heavy section of the casting. The reason for this is that the gate or fillet where the gate joins the casting is made so small that the gate cools faster than the casting itself and consequently draws away from the liquid casting adjoining it. The remedy lies in a larger gate and more liberal fillet.

Uneven shrinkage of the metal in different sections of the casting probably causes more checking and drawing than any other one thing. One of the best illustrations of shrinkage of this nature exists at the point where a light section of the casting joins a heavy section. Here the light section cools first and the heavy section, which is still liquid, will "draw" from the light section, causing shrinks or cracks. One method of overcoming this is to place a riser over the heavy section so that on cooling the heavy section will draw metal from the riser above it. Another method is to hasten the cooling of the heavy section so that it will set as fast as the light section. This is usually accomplished by setting chills in the mold next to the heavy section.

Another illustration of the evil effects of uneven shrinkage is often seen in large castings which are poured from two different ladles or crucibles of metal. The temperature of the metal poured into one sprue was not the same as that of the metal poured into the other sprue, and as a result of the uneven contraction, large cracks, sometimes extending entirely through the casting, are seen. When two ladles must be used in pouring a casting, care should always be taken to see that the temperature of the metal in each of the ladles is the same before pouring begins. Still another method for reducing the evil effects of uneven shrinkage of two sections of a casting lies in better design of the casting. Castings are often designed with unnecessary variations in the thickness of the various sections and with such a multiplicity of ribs, gussets and brackets that the inharmonious contraction of the several sections entirely defeats the intention of the designer.

High Iron Content

As previously stated, a small amount of iron in aluminum is not detrimental. However, when the iron content rises over 1½ to 2 per cent trouble is liable to start, for a high percentage of iron is usually attended with certain harmful effects. Chief among these is probably the tendency toward brittleness.

High iron also gives a coarse grained, spongy structure to the metal. The reason for this is that iron makes the molten aluminum sluggish, and as a result it must be poured at an abnormally high temperature with the usual bad results. High iron content can generally be detected by the spangled or crystalline appearance of the surface of the casting. It is also indicated by the fracture of the casting which exhibits a coarse, crystalline structure. However, inasmuch as iron may exist in the metal in sufficient quantities to be detrimental, but not in large enough amounts to be evident from the surface or fracture, absence of these visible signs does not necessarily prove that the iron is low enough to cause no trouble. Chemical analysis must always be resorted to if there is any doubt as to the presence of injurious quantities of iron. Obviously, the only sources of iron are the iron pots, ladles and stirring rods used in remelting, and the remelted metal. Any measures taken to protect the iron receptacles or tools from the action of the molten aluminum or to improve the quality of the metal which goes into the remelt will prove useful in keeping the iron content at a minimum.

The precautions suggested for avoiding hard spots are also helpful in limiting the iron content, and together with the following represent a few of the measures which have been tried and found effective:

(1) Never overheat the metal—overheating increases the action of aluminum or iron.

(2) Never use too high a percentage of sprues and gates in the remelt—each additional melting adds more iron to the metal. If high iron has a good start in the foundry, melt all foundry scrap separately.

(3) Never use scrap from indeterminate sources without first subjecting it to chemical analysis.

The importance of always keeping the iron pots and

ladles clean and covered with the protective coating of plumbago and lime cannot be over-emphasized. Aluminum will take up a certain amount of iron no matter what precautionary measures are taken, but the amount so absorbed can always be kept at a minimum by preventing, so far as possible, actual contact of the molten aluminum and its iron containers.

Particular attention is also called to the cumulative effect of adding sprues, gates, fins and other foundry scrap, already high in iron, to the charge of metal. If the foundry is experiencing troubles from high iron, the amount of iron normally absorbed from the pots and ladles is augmented by the introduction of high-iron foundry scrap, and, as a result, each succeeding crop of gates and sprues contains more iron than its predecessor. The only way to put an end to such a state of affairs in the foundry is to remelt the sprues, gates, fins and other foundry scrap separately and use the resulting metal, probably in combination with a small quantity of good metal, for the production of low-grade castings which do not call for a metal that is able to withstand severe shocks and strains.

Automotive Service Methods and Equipment

XIII. Service Welding and Machining Operations in the Yellow Cab Plant—The Lathe as a Boring Machine—Economical Salvaging Methods

By HOWARD CAMPBELL
Western Editor, *American Machinist*

A RECENT issue of AMERICAN MACHINIST contained an article describing some of the tools and fixtures in use in one of the service assembling plants of the Yellow Cab Co., of Chicago. In the present article, a number of welding and machining operations are described, these methods having been found by the Yellow Cab Co. to be the most inexpensive for making repairs on the parts described.

The operation of re-seating valve ports in cylinders

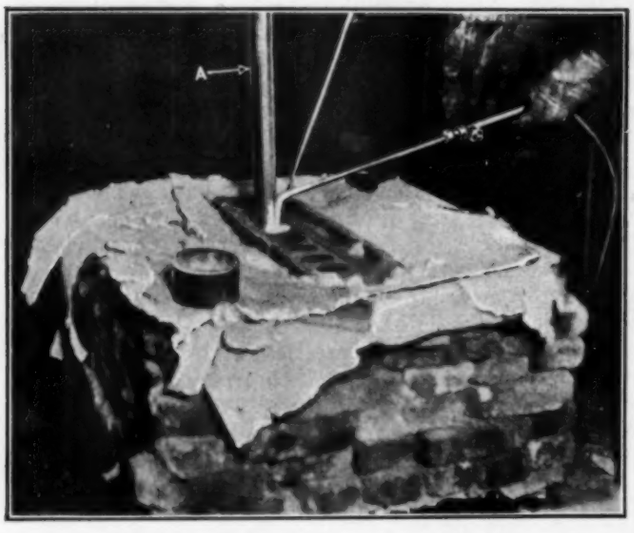

FIG. 1. WELDING A VALVE SEAT

is one with which most service men are familiar, and all know that when the cylinder can no longer be re-seated, it is usually thrown away. When a cylinder has reached such a point in the Yellow Cab plant, the entire valve port is welded over and rebored and re-seated. In Fig. 1 an operator is shown welding one of these ports. The cylinder is placed in a brick oven, as shown, and is heated by burning as much charcoal as can be packed around the cylinder. This is to prevent distortion, cracking, etc., of the cylinder, while welding. When the cylinder is sufficiently heated, the operator inserts a pipe, shown at *A*, in the port next to the one that is to be welded, this pipe acting as a sort of chimney for the gases to escape. If the valve is 1¼ in. in diameter, a ¼-in. section is cut off the end of a 1¼-in. round bar of carbon and this section is placed under the valve opening and braced there with a handful of asbestos. The carbon will not melt, and thus prevents the hot metal from running down through the hole. Then the operator, using the welding torch and a bar of practically pure iron, proceeds to build the valve port full of metal. The hole is gradually built up from the edge to the center, and when it is entirely filled, the metal is puddled very carefully in order to make it as uniform as possible. Sheets of asbestos are placed around the cylinder, over the oven, to retain as much of the heat as possible. The port is then bored and seated in the usual manner.

REPAIRING A SCORED CYLINDER

When a cylinder bore is scored, if the score is perpendicular, as is usually the case, it is repaired by the method shown in Fig. 2. The operator sets the cylinder up as shown, and using the tool shown at *A*, cleans out the score and makes a groove in the cylinder bore. Then zinc chloride is applied in the same manner as for soldering, and what is known as "Ever-Stick" metal is fused into the groove. This metal is a special alloy which has been developed by the Great Western Smelting Co., of Chicago, for this purpose. The torch in use by the operator shown in Fig. 2 is a "Rego" gas welding torch, and the flame is produced from a combination of hydrogen and oxygen.

After the groove has been filled with metal, the tool indicated at *B* is used to clean off the superfluous metal and smooth the surface of the bore. The cutting edge of this tool is ground to the same radius as the bore of the cylinder, and when the operator gets through scraping the mended spot, it is nearly as good as new.

The operation of pre-heating a crankcase preparatory to repairing by welding is shown in Fig. 3. Cracks are mended and holes are filled in with the aid of the gas-torch and aluminum solder. Before the actual operation of welding the broken spot is started, however, the case is heated all around the vicinity of the break so that the repair will be effective. In order to prevent the case from warping due to this pre-heating, the shaft *A*

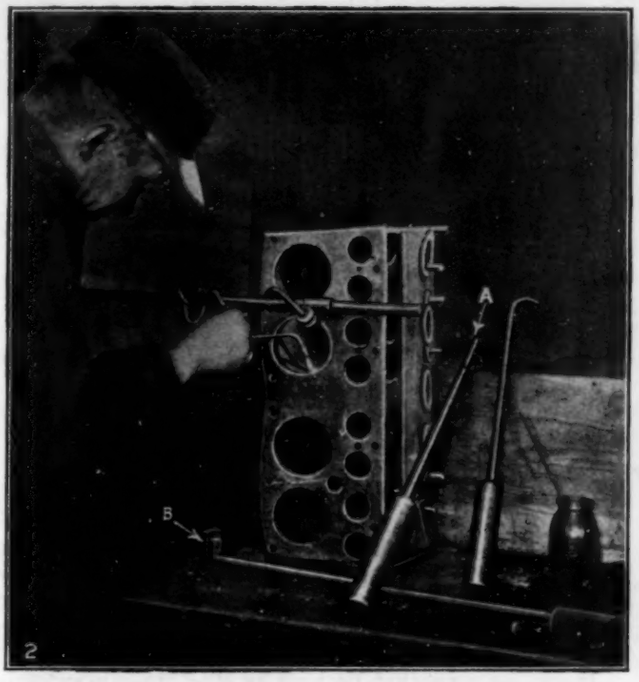

FIG. 2. REPAIRING A SCORED CYLINDER

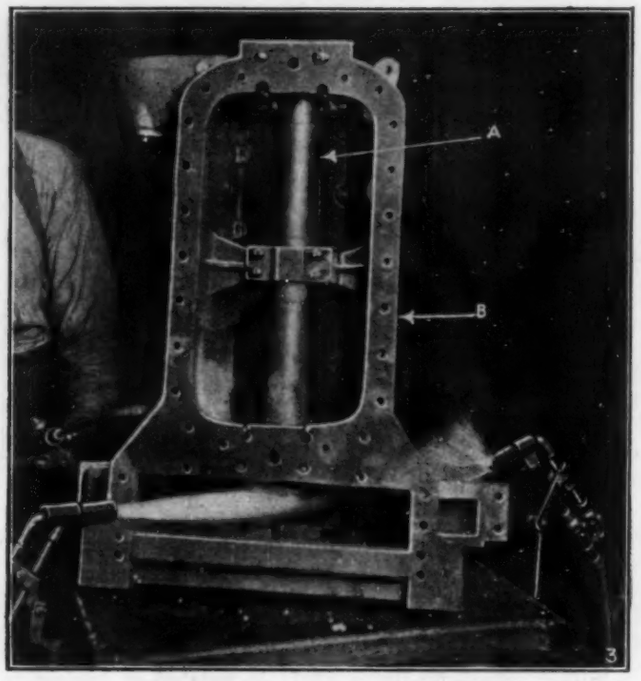

FIG. 3. PRE-HEATING A CRANKCASE BEFORE WELDING

is bolted in to the bearings and the plate *B* is bolted to the flange in the manner shown. The shaft is 2⅞ in. in diameter and the plate is 1 in. thick. The use of this shaft and plate are very effective in preventing distortion of the case.

The Lathe As a Horizontal Boring Machine

The reboring of a crankcase bearing that has been built up with aluminum solder is shown in Fig. 4. The case is held in position by two posts at the rear end, one of which can be seen at *A*, and by the boring bar itself at the center and rear bearings. This is accomplished by the use of two sleeve bushings which are bolted into the center and rear main bearings, the bushings containing bronze shells which are bored to a running fit for the bar. The bar is 1½ in. in diameter and has openings for toolbits in three places so that any one of the three bearings can be bored.

It is seldom that more than one bearing has to be rebored, which makes it possible to align the bar by using the sleeve bushings in the other two bearings.

The operation shown in Fig. 5 is that of remilling the face of a transmission case that has become so badly worn that it had to be built up with aluminum solder. The piece is held in position by means of the arbor *A* and the clamp *B*. The arbor, which fits the main transmission shaft hole, is 3⅜ in. in diameter and 12 in. long. It is attached with screws at the lower end to a plate which is bolted to the table of the machine.

The sleeves which are used to align the boring bar for boring out the transmission case bearings can be seen in Fig. 6. The bar, which is held between the centers of the lathe, is a sliding fit in the bushing of the sleeve shown at *A*. The bar shown in the toolholder is bent up on the end and is drilled so that it can be bolted to the flange of the case at the point indicated at *B*. This not only holds the case from turning, but also makes possible the use of the automatic feed. The cutting tool itself can be seen in Fig. 7, and the reverse end of the upper one of the two bushings can be seen at *A*. Inspection of the flange of the case will show where it has been built up in places that had become badly worn. To face this off, an arbor is put into the hole *A* and the piece is swung between centers and faced in the usual manner.

Salvaging Worn-Out Parts

Some of the methods of re-claiming worn-out parts are shown in Fig. 8. The piece indicated at *A* is a drive shaft that is entirely worn out in the bearings, as can

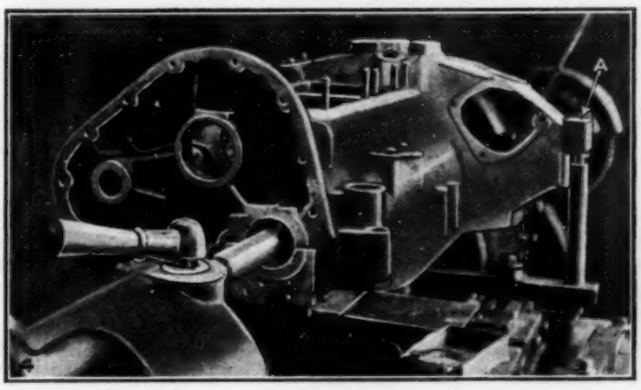

FIG. 4. RE-BORING A CRANKCASE BEARING IN THE LATHE

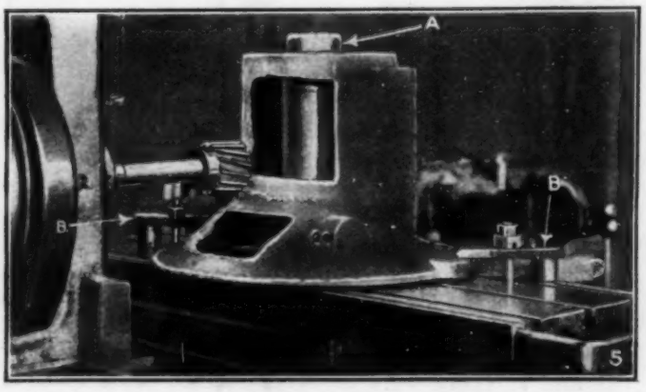

FIG. 5. RE-MACHINING A BUILT-UP TRANSMISSION CASE

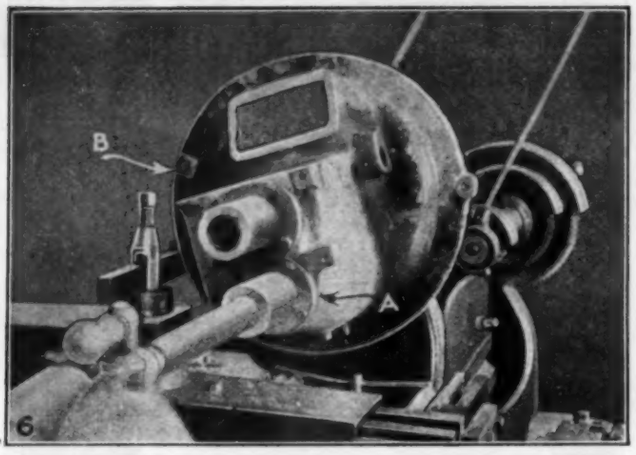

FIG. 6. RE-BORING A TRANSMISSION CASE

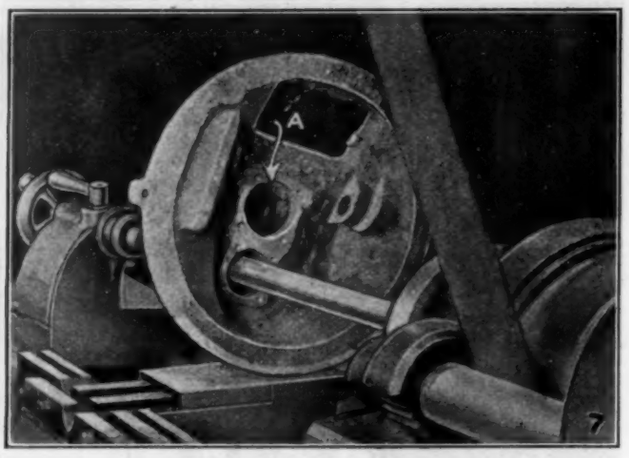

FIG. 7. VIEW OF THE BORING TOOL

be seen. Instead of scrapping this, new metal is welded into the bearing and the piece is re-machined so that when finished it appears as shown at *B*. This only takes care of one end, however. When the splined end *C* becomes badly worn, it is built up and the splines are remilled. Occasionally a shaft is twisted or broken in two, in which case the ends are inserted into a length of tubing and welded in, which makes it as solid as before. The pieces indicated at *A* and *B* are both examples of this, and the joints where the splined end enters into the tubing can be seen on the piece *C*.

In cases where an axle shaft becomes badly worn at one end and the other end is still good, the shaft is cut in two and the good end is saved. One good splined end is then welded to one end on which the taper is still good, thus making a complete good shaft. Two such ends are shown at *D* and *E*. The shaft indicated at *F* was one on which the splined end wore completely out and as there were no other splined shaft ends in stock, a section of shaft was welded on as shown, and this section will later have the splines milled in the regular way. Those sections of shaft which cannot be used further as axle shafts, are cut to length as shown at *G* and turned down to make transmission countershafts similar to the piece shown at *H*.

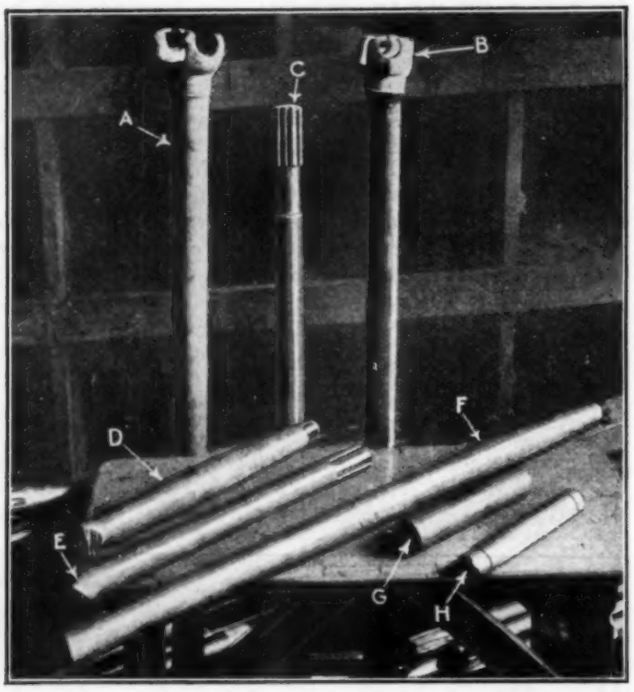

FIG. 8. SALVAGED PARTS

It can be seen that nothing is ever thrown away in this shop until every possible use has been made of it and it has reached the point where further repair would be wasteful.

Why Machine Tool Prices Cannot Come Down

BY B. B. QUILLEN
President, Cincinnati Planer Co.

The average buyer does not stop to think why prices of machine tools are high, and must continue high. He has in mind only the fact that he bought a machine at a certain price back in 1914, and thinks that he should be able to buy at that price again; but he overlooks the following items which enter into the cost of our product, and which will make it impossible to ever again buy at pre-war prices:

(1) Taxes now comprise a very important part of the cost of our product, and they will continue as one of the important items for many years to come.

(2) Freight rates are practically double what they were, and it will be a long time before they will come down to any great extent.

(3) Passenger rates are also higher, and will continue so, making selling expenses much higher than ever before.

(4) Wages will continue higher than ever before, for the reason that we are all living on a higher level, and will not go back to pre-war conditions.

(5) The working hours have been lowered to 48, and will remain on that basis, which means added cost.

(6) All manufacturers have greatly improved their product; the machines are heavier, and many attachments have been added, increasing the cost, which must be a permanent addition to the selling price.

(7) Prices have already been greatly reduced on machine tools, and there can be very little hope of their going lower. They may go up.

Factory Storekeeping and Material Control

The Fifth Article—Storeroom Layout—Benefits of Centralized Storage—How the Materials Should Be Arranged and Indexed

By HENRY H. FARQUHAR

AS IS true of most other phases of material handling, the details of the arrangement and operation of the storeroom must naturally be developed to meet local needs. The storeroom, however, serves the same purpose in the factory that the bank vault does in the storage and safeguarding of money, and no material procedure can be considered complete unless a thorough study of the storeroom needs has been made and unless storeroom operation has been systematically tied into the rest of the routine. The requirements for the storage of different materials in different types of industry may vary tremendously. Thus, in some cases, much material may be stored in the open and under such conditions it would be money wasted to build a house for its accommodation. Other supplies may be stored out-of-doors provided a roof is erected to keep the rain and snow from coming into direct contact with the material. In other cases, however, adequate housing must be provided if losses are to be prevented. It is with particular reference to this latter class of goods that the following remarks apply, although in general the problems of storage outside or inside are in many respects similar.

THE LOCATION and layout of a storeroom may be compared with the location and layout of a modern city, and any item in the storeroom should be as easily located by its index number as a numbered room in a given house number on any street in a city.

Centralized storage has the advantages of stricter supervision, more accurate inventory, less chance for duplication, better space utilization and less clerical work.

These advantages are offset by the additional transportation necessary and the less intimate knowledge of the local departmental needs and customs otherwise acquired by the storekeeper.

The Best Location for Storing Materials

In considering the physical location of the one or more storerooms which may be necessary and the responsibility for the operation of each one, a great many different things must be taken into account. On the one hand, the obvious benefits of centralization in one storage place should be weighed carefully against the offsetting cost of transportation and the less efficient service often given to the departments where materials are needed if complete centralization is in effect. A careful study of the floor plans and of the paths of travel of materials must be made to give the best location for the storeroom, all things considered. At best, in any large factory this question is a perplexing one.

Somewhat akin to the foregoing considerations are those affecting the determination of whether raw materials and partly worked or finished parts are to be stored in the same room. Are factory supplies, such as clean cotton waste, oils, lubricants, etc., to be kept in the same storeroom with raw materials? Are special stores used only in one department to be stored in or contiguous to that particular department, or are they to be stored in the central storeroom?

If, through considerations of service to the departments concerned, departmental supplies are to be stored in the department, how is accurate control of inventory and of receiving and issuing in general, to be maintained? On the other hand, if such supplies are to be kept in the central storeroom because of the concentration and more accurate control possible through such an arrangement, how is the procedure to be arranged so that service to the departments themselves will not be sacrificed?

The same questions arise in the storage and responsibility of spare parts for machines and of all the miscellaneous items of supplies used in the maintenance department. Since the latter department is itself strictly a service department for the whole establishment, very careful consideration must be given to the storage and handling of maintenance supplies so that this department may not be handicapped through restrictions or regulations in the material supply.

One may not safely generalize in answer to such questions. On the other hand, however, there are certain considerations which must not be overlooked in the answer to any one of these questions under given conditions. I trust that the following observations may assist in avoiding some of the mistakes frequently encountered in practice because of superficial attention to the various points involved.

Advantages of One Storeroom and One Head

There are many undoubted advantages of centralizing the storage of *all* materials in one place. Serious consideration, particularly in small and medium sized plants, should be given to this possibility. Foremost among these advantages is that of being able to fix the responsibility for all functions which a storeroom is supposed to perform. Supervision under such circumstances may be much more easily obtained and of a stricter and more detailed nature than is possible with scattered storage. Furthermore, inventory may be kept not only more accurately but also at a lower figure by avoiding the duplication almost inevitable with several storerooms. Better space utilization may be secured for the same reason. Also the clerical help needed in storeroom attendance and in balance sheet and all other clerical operations may be lessened.

As opposed to these advantages are the disadvantages of additional transportation and of a less intimate knowledge of local departmental needs and customs on the part of the central storekeepers.

Whether centralized or decentralized storage is

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adopted, the responsibility for all receipts into stores, storage, custody while in stores, and issue from stores, should be strictly centralized. If we have subsidiary storerooms, therefore, they should all be definitely placed under the supervision of a head material man for the whole establishment. In no other way can the uniformity in practice necessary to strict control be secured.

There may be one storekeeper required on full time for each subsidiary storeroom, possibly more, but all of the storekeepers and assistants should look up to one man, who in turn is held responsible by the manager for the upkeep of the whole material storage system. Just so far as possible the same routine in receiving, accounting for, and issuing materials should be followed throughout all the storerooms.

How to Control Departmental Supplies

In general it has been my experience that whether we have departmental storerooms from which articles are issued to the workplace, or whether we have no departmental storerooms but have everything centralized, the best way to handle departmental supplies is to issue to the department (whether to the workplace itself or to the subsidiary departmental storeroom) only enough supplies to last a reasonable length of time, say from one to two weeks. The main reservoir of material for this department should be retained in the central storeroom.

Depending upon the type of material used in the department, after supplies have been forwarded from the central storeroom, no further paper records of the transaction are necessary when these supplies are put to use. As an example, nails, bolts, tacks, and similar articles may be issued to the department in considerable quantities, and may be charged at the time simply to departmental supplies and issued thereafter to the workmen as needed without additional paper work.

Or again, where it is desirable from a cost-finding standpoint to charge each job with its exact amount of material used, it is necessary to require a stores issue for each lot of material furnished. In this case, the original stores issue made out when the materials were transferred from the central to the departmental storeroom may serve simply as records for the balance sheet, and the stores issues made out in the department when goods are issued to specific orders form the basis of cost records. Additional discussion of this question will be found in a later installment under the heading of Maintenance Stores.

The important point in this connection, however, is that a simple yet sufficient procedure should be worked out and standardized. Responsibility should not be lessened through having as many different systems as there are persons concerned with the handling of materials.

Arrangement of Storage Equipment

The requirements of the storeroom in regard to the varieties of articles to be stored and therefore in regard to the size and exact arrangement of aisles, bins, and other storeroom equipment, are so varying that it is out of the question to indicate any arrangement which will be best under all circumstances. Some general points in regard to the arrangement of the storeroom will be discussed, but the question of equipment will be taken up in detail in the next installment.

The location and layout of a storeroom are in many respects analogous to the location and layout of a modern city. After a location with maximum accessibility to the various lines of travel has been selected, it is necessary to have an internal layout which will best serve the needs of the travel and general convenience of the articles to be accommodated.

In the storeroom there must be a definite and preferably only one point of ingress for all material. There must be provided broad avenues for the heavy traffic back and forth from the various "streets," and a systematic method of numbering racks and bins is just as necessary as in numbering streets and houses. It should be just as easy for a stranger in the storeroom to find a given item by knowing its index location as it would be for him to find a particular room number in a given house number on any street in a city.

Adequate provision must be made for plenty of receiving and unpacking room, for office space, and for all auxiliary equipment needed in the transaction of business. Adequate protection must be insured through the exclusion of combustible material, through sprinklers, fire extinguishers and similar measures, and through all other precautions against damage by fire. Means must also be taken that unauthorized persons be excluded from the storeroom, that the whole place be adequately lighted and heated, and that cleanliness and neatness be maintained.

Making Floor Plans for Racks and Bins

After information covering these numerous points has been collected, and after the requirements in kinds and amounts of storeroom equipment have been determined, the actual process of arranging all of these in proper relation begins. For this purpose, acurate floor plans on a scale of one inch equaling, say 10 ft. should be prepared. On these plans should be carefully located all permanent obstructions such as columns, stairways, elevator shafts and the like, as well as all windows and doorways.

On the same scale on another tracing, so that templates may later be cut out, should be drawn plan views of each different kind of equipment to be used, such as standard racks and bins, bar stock racks, belting racks, trucks and all other movable apparatus. As many templates as there are actual pieces of equipment should be provided. On floor plans showing permanent obstructions, these templates are arranged tentatively and held in place by pins, being shifted experimentally to finally obtain the best possible arrangement.

The necessary width of the aisles, and the location of equipment relative to windows must be carefully considered, the general object being, of course, to get the maximum equipment suitably arranged in a minimum floor space. A little ingenuity in arrangement will often save many square feet of floor space. When the final layout has been worked out on paper, the templates may be fastened securely to the floor plans and this paper layout used as a basis for the actual moving. The transition from the existing to the new arrangement may then actually occupy as long or as short a time as seems desirable to prevent disrupting continuous and effective service to the shop.

In Fig. 9 is illustrated a method of indexing which will be found convenient under many conditions. It will be noticed that the following general principles are taken into consideration:

(1) Letters and numbers are used alternately.

(2) Letters are used for those things of which there

are the fewest to designate, such as different buildings, different positions of the storeroom, different rows of racks along the shortest dimensions, etc.

(3) Numbers are used for those things of which there are many to designate, such as the number of storeroom, the different rows of racks along largest dimensions.

(4) Lettering and numbering always start from the permanent obstruction, such as the walls and floors, and proceed outward and upward in lines of probable expansion. This system allows the addition or elimination of racks and bins on the end or on top without confusion due to vacant designations for missing positions.

Thus the shaded area in Fig. 9 represents, in plan, the area occupied by one section of a standard rack,

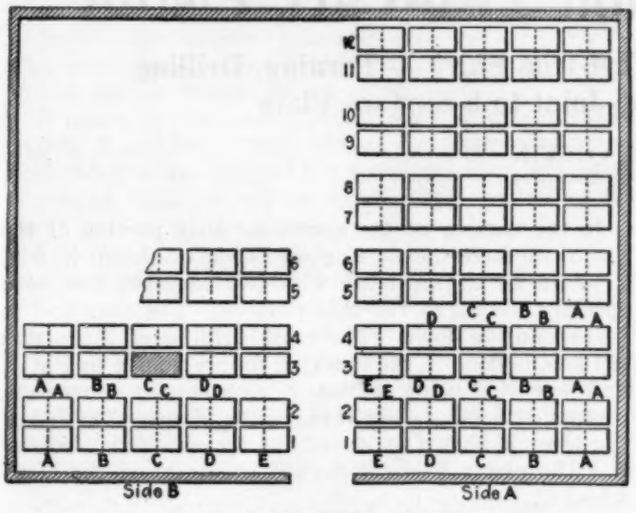


FIG. 9. METHOD OF INDEXING RACKS AND BINS

corresponding to one house of several stories on a street. Its index is B 3 C, that is, position B of the storeroom, row 3 down the main aisle, row C out from the wall. This rack may be four stories high, the location of an article in a bin in the second story from the section would be B 3 C 2. It is well to have such designation on the bins themselves.

The location, in case it is reasonably permanent, should be entered on the balance sheet for each article of material. Where locations are constantly changing it may not be practicable to keep the balance sheets posted for locations, but the permanent index should be on the bin. The storekeeper should be required to keep a current card file showing just where each article may be found, so that a new man may immediately locate any article in stock.

Where a good system of stores and worked material symbols is in use, it will often be found that the most satisfactory method of storage is alphabetically by symbol. With standard interchangeable racks and bins such an arrangement, particularly in the metal-working storeroom, is easily maintained. Aside from the symbols which are with each article and identify it, no other indexing scheme is necessary. However, even in this case a card index of the location by name of the article is often good insurance against lost time on the part of a new attendant or where the symbol does not appear on the issue slip.

With mnemonic symbols, however, the symbol of one item may be SV-SS, the next SV-ST, the next SV-SW and so on. Each of these items would be placed alphabetically in the bins exactly as their symbols would appear in a dictionary and when the symbol appears on the issue slip the attendant may readily locate the article required.

Such a systematic arrangement by symbol is not always possible for all items nor desirable for all portions of the room, however, and common sense must govern in assigning locations and indexing. It would be foolish, if not impossible, to store bar stock in long lengths between screws and nuts, for instance, just because its symbol might fall between the symbols of these articles, nor would one logically store heavy, much used castings away back from the door or elevator.

Exceptions can be readily made in such cases without destroying the advantages of storage by symbol where this seems otherwise desirable. In such cases, the rows of racks, the individual racks themselves, and the separate compartments within each rack must be numbered and lettered with a cross index for each item, according to some such definite plan as that outlined.

Machine Tools in Chinese Shops

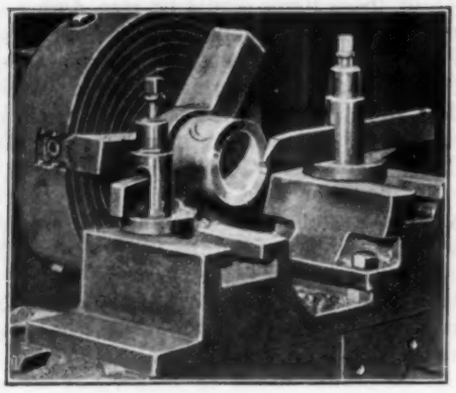
By Sam Dean
Peking, China

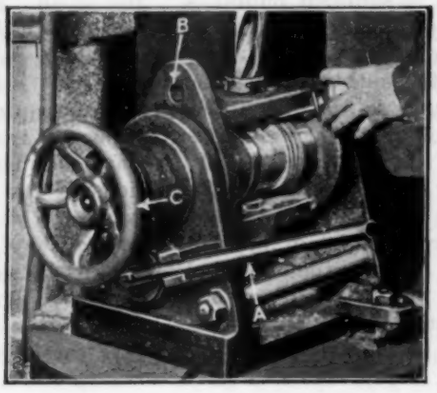
Many Americans do not know that there are in China several Chinese companies which make good gap lathes, drill presses and planers for rough work, and make them so cheaply that they supply practically all the repair shops of the country. Only the larger shops such as the railway shops have foreign tools, and these are mostly equipped with English machines.

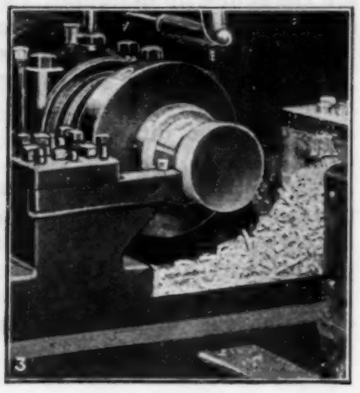
There is a large and increasing demand in China for machine tools of the repair shop type, but the Chinese have to be educated to the fact that one good foreign tool is worth several cheap Chinese made machines. Perhaps the most popular American machine tool here is the lathe. This is rather too light for the work it is made to do, but accuracy doesn't matter on the jobs put through in most cases so it does fairly well.

The expensive machines with gear boxes, electric drives and all that are quite outside the present demand and pocket book. Now and then a large mill will buy good machine tools, but there are comparatively few such mills. However, every city now has an increasing number of small machine shops and this is the trade which has volume and now uses Chinese and Japanese goods. These shops are run in many cases by graduates of Chinese technical schools and Chinese technical schools are mostly equipped with Chinese or Japanese, or at most English made or German, made tools. Naturally the students buy for their own shops what they have learned to use. Also the schools with their small incomes buy the cheapest machines.

Personally, I feel that there are two lines which American machine tool manufacturers could follow in order to get the Chinese market. One is to put their tools in technical schools out here at prices that would enable them to be bought, rather than shoddy Japanese or Chinese machines. The other is to find out the companies that are supplying the Chinese repair shops with machines and in these shops at least work hard to put in American machines. I doubt very much whether we can compete with the Chinese made machine for the makeshift repair shop, but we certainly ought to be able to furnish the machines that make China's machine tools.





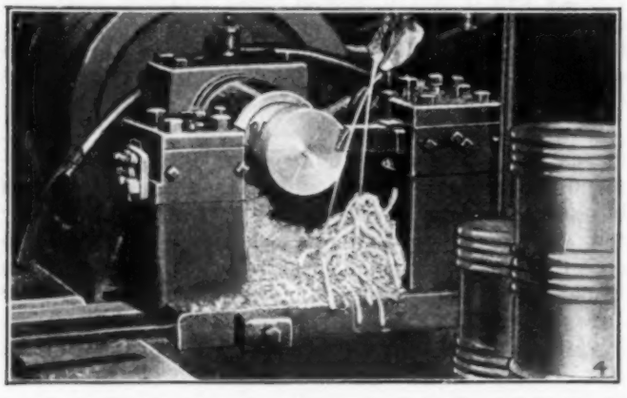


Machining the Marmon Two-Part Piston

Operations on Aluminum Head and Cast-Iron Skirt — Turning, Drilling and Grinding — Lapping End-Joint to a Surface Plate

By FRED H. COLVIN
Editor, *American Machinist*

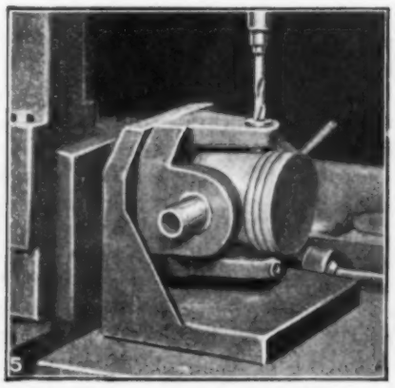
THE Marmon motor uses a combination piston of aluminum and cast iron, the head being of aluminum to more readily dissipate heat, while the skirt is a cast-iron shell in order to secure the advantages of that material as a wearing surface. This construction allows the use of a floating piston pin without the necessity of using any special retaining device to prevent the end of the pin from scoring the cylinder wall. In this case, the cast-iron skirt slips over the ends of the pin and naturally prevents any possibility of contact with the cylinder wall.

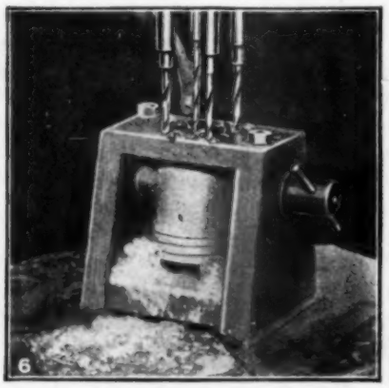


In the making of the aluminum alloy portion of the piston we have the turning operation as shown in Fig. 1 where an engine lathe with two toolposts has been specially arranged for this purpose. The rear tool is turned upside down. The cross drilling of the piston pin hole is done in the indexing fixture shown in Fig. 2, only one side being drilled at each spindle movement, instead of drilling clear through the piston. The indexing lever is shown at *A* and the opposite index hole at *B*. The piston is easily turned by means of the handwheel *C*.

Drilling Operations

Using a crosspin in the piston-pin hole to hold the piston back against the face of the skirt, the skirt end is faced off and the ring grooves cut on the lathe shown in Figs. 3 and 4. Here again, special toolposts with suitable tools are provided on an ordinary lathe carriage. Then the piston goes to the fixture shown in Fig. 5, where smaller holes are drilled. Here the piston is located by means of the hollow plug *A* through the piston-pin holes, the fixture being one of simple design. The two parts of the piston are held together by four bolts, the holes for these being drilled as in **Fig.** 6. These holes are in the thick wall of the piston center and are then tapped for the retaining screws.





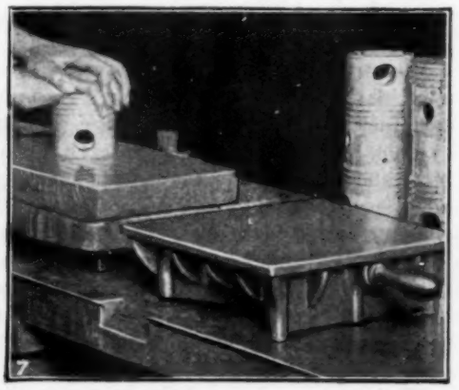
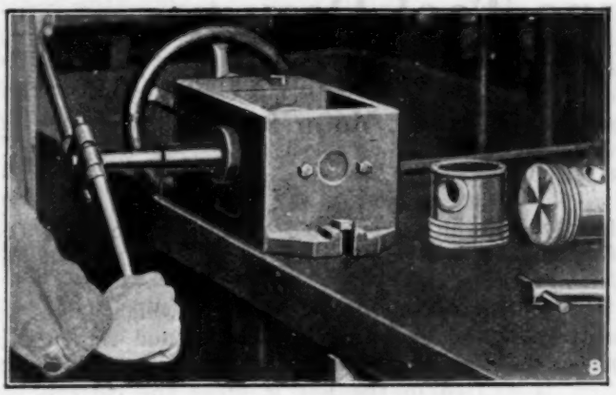
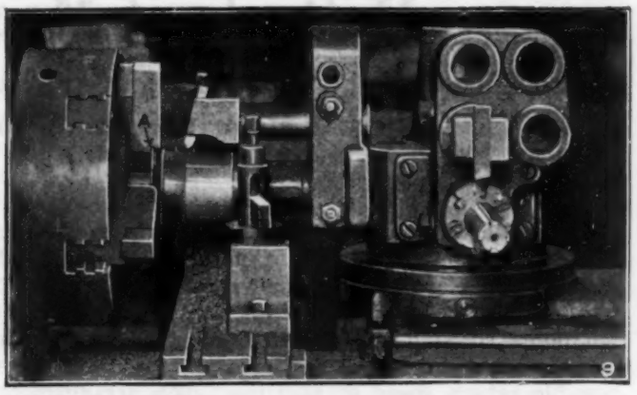


FIG. 1. ROUGH-FACING PISTON CENTER. FIG. 2. DRILLING PISTON-PIN HOLE. FIG. 3. ROUGH-TURNING PISTON CENTER. FIG. 4. FACING AND CUTTING GROOVES. FIG. 5. ANOTHER DRILLING OPERATION. FIG. 6. DRILLING FOR HOLDING SCREW. FIG. 7. LAPPING THE FACE FLAT





The end of the piston where the skirt joins the inner portion is then carefully lapped as shown in Fig. 7, in order to insure proper contact between the two portions. The small surface plate beside the cast-iron lap is used in testing the flatness of the end surface.

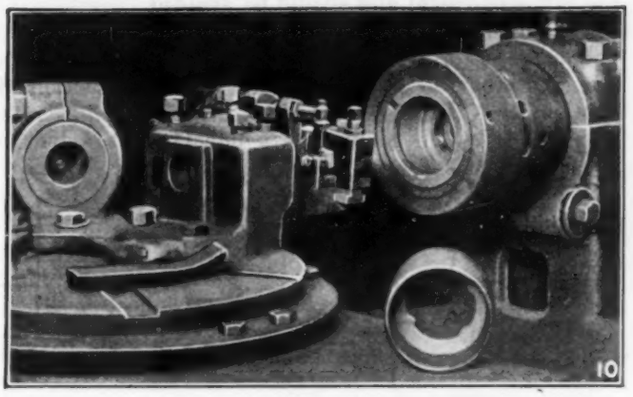
A piston is then placed in the box-like fixture shown in Fig. 8 and held firmly against the lapped surface so that the final reaming of the piston-pin hole will bring it square with the piston skirt. This completes the inner portion of the piston.

The turning and boring of the cast-iron skirt is done on the Potter & Johnson lathe, shown in Fig. 9. It will be noted that a beveled flange is cast at the end of the skirt, so as to afford an easy means of holding it firmly in the chuck as shown at *A*. Held in this manner, a substantial cut can be taken without danger of pulling the work out of the chuck. The tool used can be plainly seen.

Finishing the Skirt

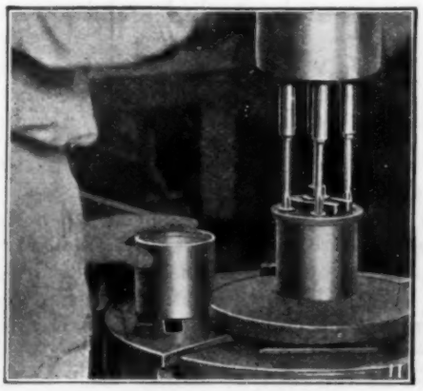
Clamping the skirt in a split chuck, the inside is then bored and faced on a turret lathe as shown in Fig. 10. The finished skirt shows the shape of the flange with the projections which allow for the bolt holes. The drilling and reaming of these holes is shown in Fig. 11, a special four-spindle drilling head being used for the purpose. The reamers are guided to insure accuracy.

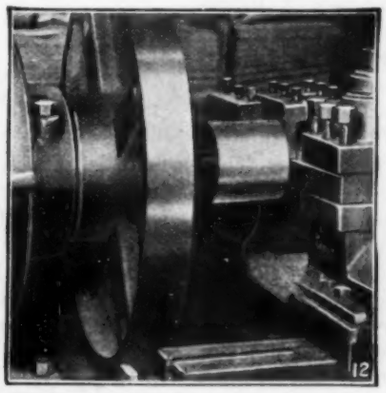
The final finish cut is then taken in a Lodge & Shipley lathe with the skirts mounted on a suitable mandrel, positioned against the inner side of the flange, and located and driven by plugs through the bolt holes, as shown in Fig. 12. The final finish is by grinding as shown in Fig. 13. Here the skirt is mounted on the same mandrel as for the final turning operation, thus avoiding one handling and the possibility of a difference in the two mandrels.



Those who were familiar with the older methods of manufacturing motor pistons and who have not kept pace with the newer developments, will perhaps think that the methods here described are unnecessarily complicated and that undue care is taken in a number of the operations. But one of the lines of improvement in the construction of the automobile motor has been in the production of better pistons to fit the improved cylinder bores, and careful tests, as well as the results of long experience in actual service, have shown that it pays to have them as near right as possible, even though a greater expense is necessary to do it.

Pistons that are so designed as to expand uniformly, that not only maintain compression but also prevent the pumping of oil and the consequent formation of carbon in the cylinders, are a great asset to any motor. Proper bearing of the skirt, as well as suitable rings, is necessary for the best results. So that operations which seem to border on "fussiness" have proved to be worth while in high-grade motors.





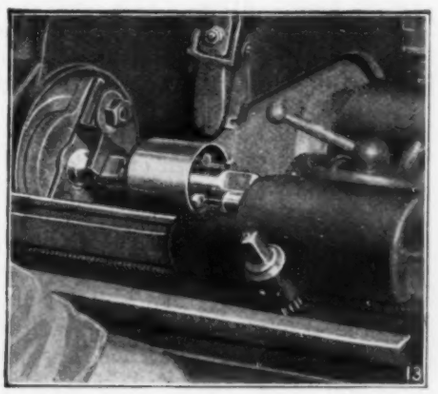


FIG. 8. THE FINAL REAMING. FIG. 9. TURNING THE SKIRT. FIG. 10. BORING THE INSIDE. FIG. 11. REAMING STUD HOLES. FIG. 12. FINISH-TURNING. FIG. 13. GRINDING THE SKIRT

Methods of Machine Tool Design

Conclusion of the Fourth Article—Variable Speed Planer Drives of Various Types—Electric Motor Drive for Planers—Best Type of Motor to Use

BY A. L. DELEEUW

THERE are a number of arrangements in existence for the purpose of giving variable cutting speeds to the planer. The simplest arrangement would be to give two or more speeds to the countershaft, but doing so would change the return as well as the cutting speed. As it is desirable to have the highest possible return speed at all times, such arrangements are not economical and should be avoided.

Practically all variable speed planer drives have a single speed for the return and variable speeds for the cut. One of the well-known existing constructions is that of the G. A. Gray Planer Co. which is illustrated in Fig. 61. The countershaft pulleys that drive the

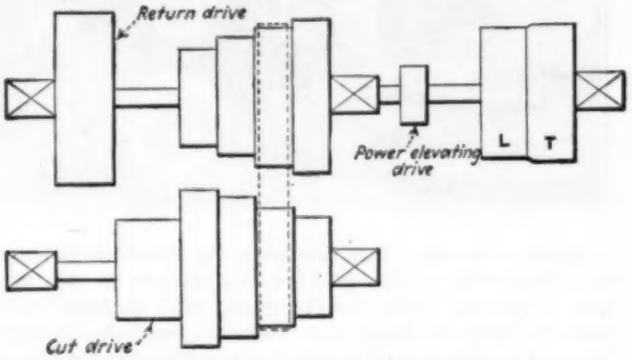


FIG. 61. VARIABLE SPEED DRIVE OF GRAY PLANER

return and the cut are not on the same shaft, but are mounted on two different shafts, each of which is provided with a cone pulley. If we consider one of these cone pulleys as the driver and one as the driven cone, then we can say that the return pulley is mounted on the shaft of the driver, and the cutting pulley on the driven shaft. The driver itself is driven either from a countershaft, a motor or any other source of power. This arrangement furnishes a constant return and a variable cutting speed. Instead of cone pulleys some other speed varying device might have been used, such as change gears or a gear box.

A rather interesting manner of furnishing variable speed to the cut is exemplified by the Cincinnati two-speed planer drive. This device is shown diagrammatically in Fig. 62. There is only one countershaft on which six pulleys are mounted. Pulleys *A*, *B* and *C* are loose; while *D*, *E* and *F* are tight. *A* and *B* receive the belts which come from the line shaft and are run at different speeds. As a matter of fact, pulley *B* runs at half the speed of pulley *A*. Two shifter forks are provided which are operated by one shifter rod and which shift both belts at the same time, so that when the left-hand belt is on pulley *D* (tight), the right-hand belt is on pulley *C* (loose). Pulley *F* is as wide as the ordinary return pulley, that is, twice as wide as the return belt plus something for clearance. Pulley *E*, on the other hand, is only wide enough for the cutting belt and does not permit this belt to shift sideways. This belt is held in position by a special fork which can be operated from the floor. If this fork holds the cutting belt on pulley *E*, we have the following condition:

The left-hand belt drives pulley *D* which drives the shaft at the high speed. Both cut and return take place, therefore, at the high speed. When the special fork is shifted to the left it takes the cutting belt with it and places it on pulley *C*. This pulley is wide enough to admit the belt coming from the line shaft and also the cutting belt. With this cutting belt in this position we have the following conditions: The left-hand belt still drives the shaft and with it pulley *F*, so that the return still takes place at the high speed. The cutting belt, however, is no longer on pulley *E* but is driven by pulley *C* which is the low-speed pulley. We see, then, that the cutting takes place at low speed and the return at the original high speed. The fact that the belt does not come straight down to the machine is not a serious matter. Countershafts of this nature are applied to the smaller sizes of planers where the belt is narrow and the distance between countershafts and machine pulley relatively large. Besides, both top and bottom of the belt are positively controlled by belt eyes.

When it becomes advisable to speed up an existing planer, all points mentioned in the previous paragraphs should be carefully considered. As a rule it will be found impossible to speed up the entire planer horizontally. Even when it is possible at all to increase the return speed, it will generally be found that this cannot be increased as much as the cutting speed.

In addition to the points considered above, such as belt speed, rim speed, speed of shifting, etc., there is still one other point which should be considered when speeding up an existing planer. In many planers the

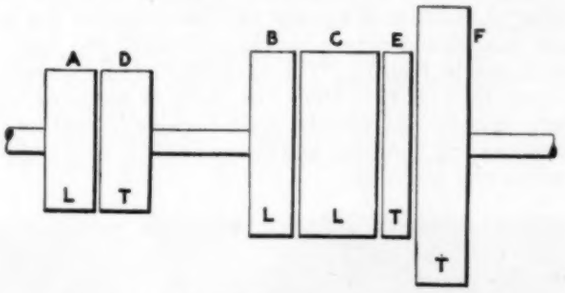


FIG. 62. VARIABLE SPEED DRIVE OF CINCINNATI PLANER

feed is driven from a device which makes a partial turn at every reversal. This device is generally geared so as to get the highest permissible speed when the belt starts the return stroke. If it is possible at all to increase this return stroke, considering belt speed, etc., it remains yet to be investigated whether the feeding mechanism will permit of such increased speed. If not, it may be necessary to change the gearing so as to bring the speed of the feed mechanism back to the original amount.

When a planer countershaft is driven by an electric motor, either direct or through gearing, we will find the same problems as we found before and in addition certain problems due to the characteristics of the motor. With direct current we will have a series, a compound, or a shunt-wound motor. Of course a series-wound motor is out of the question on account of the unstable speed; the planer would run faster with a light than with a heavy load. Both the weight of the piece to be planed and the size of the cut to be taken would affect the cutting speed, and this is not permissible. In all machine tools we must maintain automatically the speed for which the machine is set. If we wish the machine to run at a speed of 50 ft. per minute, this 50 ft. must be maintained until the time when we wish to run at a different speed. This is the reason why a series-wound motor is unfit for practically all machine tools. It is also the reason why the shunt-wound motor lends itself particularly for machine-tool drives.

Characteristics of Shunt-wound Motor

A shunt-wound motor maintains its speed with wide fluctuations of load. Though there is some variation, it is so small as to be negligible for practical purposes. A large load means a large amount of current going through the motor. The heavier this current the greater the drop of speed of the shunt-wound motor, though it should be remembered that at all times this drop of speed is quite small. Vice versa, when there is a relatively large drop in speed we may expect a heavy current to flow through the motor. The amount of current which may flow through the motor when the armature is retarded by some mechanical means may be so great as to cause serious trouble. For this reason we must never subject a shunt-wound motor to conditions where its speed may be much retarded by mechanical conditions. This, however, is exactly what happens when we employ a shunt-wound motor for a planer drive. At the moment of reversal there is an enormous slip between belt and pulleys. This may be either between the lower pulley and the belt or between the upper pulley and the belt, or it may be a combination of the two. There is, then, a strong tendency to retard the motor, which we will find to be the case when we apply a tachometer to the motor shaft and which will show up by a heavy peak load if we insert an ammeter in the circuit. The reading one gets at this peak does not necessarily indicate the amount of power required at the moment of maximum load.

A motor with an efficiency of 88 per cent at full load may have a much lower efficiency at 50 per cent overload and may have an efficiency approaching zero when the overload is several hundred per cent. Such an overload of several hundred per cent may well happen where a shunt-wound motor is used for planer drives. If a 25-hp. motor takes in an amount of current sufficient for the full load of a 75-hp. motor, it does not indicate that 75 hp. is required for the work done, but that the motor has become so inefficient that it requires a current of 75 hp. input for, let us say, 40 hp. output.

A 65-hp. motor driving a 14 x 12 x 30-ft. planer registered at the moment of reversal an amount of current equivalent to 180 hp. When the motor was replaced by a 90-hp. motor, an amount of current was registered at the moment of reversal equivalent to 120 hp., thus showing that the smaller motor, on account of the large overload, had become so inefficient that it required an input of 50 per cent more current than was needed to carry the load. It is very essential that a shunt-wound motor should be of sufficient size to carry the peak load without too great a loss of efficiency.

The compound-wound motor, having some of the characteristics of both the series and shunt-wound motor, will permit of a certain amount of fluctuation of speed without an excessive amount of current going through the armature. At the same time its speed will not be entirely reliable; whereas a shunt-wound motor under ordinary working conditions would have a fluctuation of speed of not more than 5 per cent, a compound-wound motor might show a variation of 20 per cent. On the other hand, if a momentary excessive load should come on the motor, the compound winding will protect it against an excessive input of current.

For these reasons compound-wound motors were thought at one time to be the logical solution of the problem of planer drive by means of a motor. However, it was found that a new difficulty had entered. If we have a piece of work which can be cut at 45 ft. per minute and we use a compound-wound motor permitting a fluctuation in speed of 20 per cent, then the table will run at a speed of 54 ft. before the tool enters the cut and at 45 ft. afterward. Now, if anything, a tool should enter the work slowly, after which it might be brought up to its ultimate cutting speed, but the reverse should never be done. Striking the work at a speed in excess of the speed at which it is run is apt to destroy the tool very rapidly. To overcome this difficulty a flywheel was put on the motor shaft.

The combination of compound-wound motor and flywheel may still be found on many planers. A moment's thought, however, will convince anyone that this combination has no right of existence. To use a motor with compound winding in order to permit speed fluctuations and then to put on a flywheel so as to prevent these same fluctuations does not seem to be good logic.

The thing to do is this: *To select a shunt-wound motor of sufficient size so that the input of current is not excessive at peak load, thus retaining the efficiency of the motor.*

As a rule when the motor is geared or directly connected to the countershaft we will find the countershaft attached to the planer itself. Such a construction necessarily limits the distance between countershaft and planer pulley shaft, and the belts will be shorter than is desirable. Where the motor is placed on the floor and the countershaft is attached to the planer so that there will be a belt from the motor to the countershaft and another one from the countershaft down to the machine pulley, the effect of slippage is minimized, due to the great length of belt between motor and machine.

Same Rule for Induction Motors

Induction motors act much like shunt-wound motors and the same rule should be applied in regard to their use for planer drives as we found for shunt-wound motors.

It has been pointed out that the main reason why it is difficult to obtain a high return speed for a planer lies in the fact that a large amount of energy must be given to the pulleys in a very short time. Driving the planer by a direct-current motor offers a means of overcoming this difficulty. The author applied and patented the following method in 1903:

An adjustable-speed motor was used to drive the countershaft. A special dog would cut out all field resistance, just before reversing, so that the planer would run at low speed at the moment of reversal. After reversal a certain amount of resistance was cut in, the speed of the motor depending on the amount. As a result it was possible to run at any desired cutting or return speed. This same principle is now used with certain modifications and improvements in the direct electric planer drive.

The Mitchell Planer Drive

A drive to which we have referred before is the Mitchell planer drive. This drive has certain interesting features, especially for the larger sizes of planers, but has, nevertheless, not come into common use, probably due to the fact that shortly after its introduction the direct planer drive was perfected and proved to be very acceptable, particularly for heavy planers. The Mitchell drive is illustrated diagrammatically in Fig. 63. Originally these drives were applied to 7, 8 and 10-ft. planers of the British Westinghouse Electric Co. They were illustrated in *American Machinist* of June 2, 1904. A countershaft *A* (which itself might be driven from a motor, either direct or through belt or gearing) drove two countershafts, *B* and *C*, in opposite directions and at different speeds, as may be clearly seen in the illustration. The pulleys *D* and *E* would drive the machine pulleys *F* and *G*, one for the cut and the other for the return. Both pulleys *F* and *G* were tight on the planer shaft, but the belts connecting *D* and *F*, or *E* and *G*, were slack unless one of the idlers, *H* or *I*, was pressed against the corresponding belt. If this were done, that belt would become a driving belt. On the 7-ft. planer the idler was brought against the belt by means of the action of a dog, but on the 8 and 10-ft. planers the idler was operated by a pneumatic cylinder of which the valve was actuated by the table dog. The advantages of this drive will readily be recognized. The belts can be made as wide as one desires because they do not shift. There is consequently the possibility of unlimited power. Furthermore, when applying the idler by means of a pneumatic cylinder, it is possible to make that device act in such a way as to bring the idler as rapidly or as slowly against the belt as one may wish. It is therefore possible to start the planer without shock, regardless of the speed. As a matter of fact, the 8-ft. planer had a return speed of 125 ft. per minute which was, at that time, exceedingly high and would be considered high even at the present.

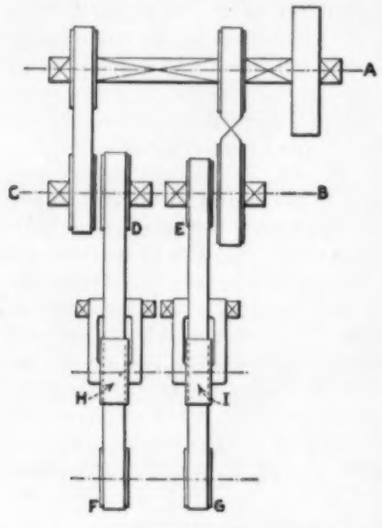


FIG. 63. DIAGRAM OF MITCHELL DRIVE

One of the disadvantages of this arrangement lies in the possibility of the planer starting up unexpectedly, due to the fact that the belt may be somewhat shorter than it was meant to be, something which may happen due to excessive moisture in the atmosphere, or for other reasons. A more serious objection is caused by the pneumatic control. The direct control by means of a dog is not suitable for the larger sizes of planers and a pneumatic control depends so largely on the air pressure in the line that it is not safe to count on an exact reproduction of the shifting action every time. In other words, the planer may shift sooner or later according to the air pressure at hand.

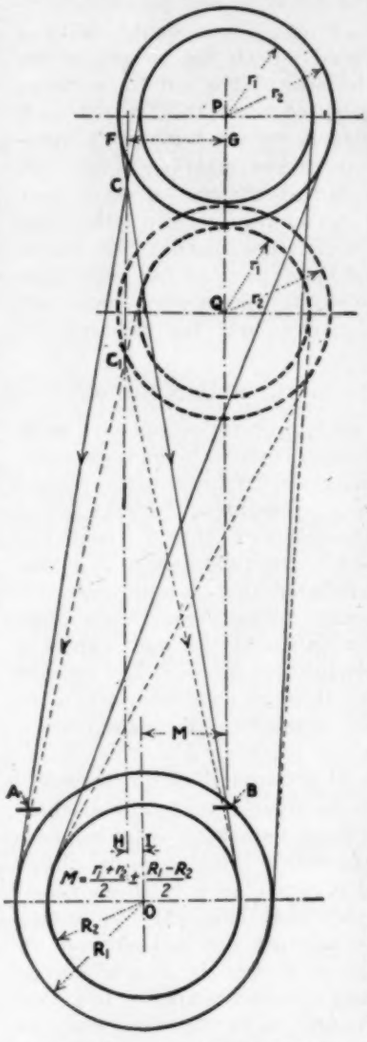


FIG. 64. DIAGRAM TO SHOW EFFECT OF CHANGING POSITION OF COUNTERSHAFT

In Fig. 64 is shown a planer drive with the machine shaft at *O* and the countershaft at *P*. The cutting belt approaches the machine pulley through belt eye *A*, while the return belt goes through eye *B*. A belt eye is the end of a lever of which the short arm is moved by means of a cam while the long arm describes an arc of a circle, thus moving the belt from one pulley to the other. The distance the belt moves depends on the length of the lever arm to which the belt eye is attached. Or rather we should say, it depends on the distance from the belt to the fulcrum of that lever, which is very much the same so long as the belt is located in one positive position.

However, if, for one reason or another, the belt would sometimes be nearer to, and sometimes farther from, the fulcrum, the distance which it would travel would be variable. Such a condition might be brought about by a change of location of the countershaft. If, for instance, countershaft *P* should be moved to the right, both belts would also move to the right, and as a result the travel of the cutting belt would become less and of the return belt more. In order to avoid this condition we must see to it that, if we have to change the location of the countershaft, we maintain a certain relation to the machine.

We see at once that if we move the countershaft to the right or to the left it must have the effect of lengthening one and shortening the other movement; whereas if we move it in a vertical plane we increase or decrease the travel of both belts. We cannot entirely avoid such increasing or decreasing of the belt travel, but we can hold it down to a minimum and in order to do so and, at the same time, to make the variation the same for both belts, we should have conditions so that

the angle made by the two belts—namely *ACB*—is bisected by a vertical line. If then we move countershaft *P* to the position *Q*, the bisector will remain the same but the angle will now become AC_1B. We see that both belts where they go through the belt eyes have come somewhat closer together but that the movement is exceedingly small, and we will find that it is well within practical limits.

A General Formula

It is customary to dimension the distance between the vertical plane of the countershaft and that of the machine shaft, which distance is indicated in the sketch by *M*.

We see from the drawing that the distance $FG = \frac{r_1 + r_2}{2}$. We see also that the distance $HI = \frac{R_1 - R_2}{2}$, and as the distance *M* is the difference between *FG* and *HI* we find $M = \frac{r_1 + r_2}{2} - \frac{R_1 - R_2}{2}$.

As shown in the illustration the crossed belt is used for the return, which causes *HI* to be at the same side of the vertical bisecting line as *FG*. If the crossed belt were on the cutting pulley, *HI* and *FG* would be on opposite sides and the formula would become $M = \frac{r_1 + r_2}{2} + \frac{R_1 - R_2}{2}$, so that the general formula is $M = \frac{r_1 + r_2}{2} \pm \frac{R_1 - R_2}{2}$.

All that applies to planer belt drives applies equally well to any other machine in which a reciprocating member receives its drive from shifting belts. Such is the case with some slotters, some shapers, some keyseaters, and a few other machines. None of these machines, however, presents the problems of the planer in such large proportions as the planer itself, so that one who can successfully design a planer drive does not need to fear the difficulties of a slotter or shaper drive.

Base the Selling Prices of Stock Machines on the Cost of Replacement

By S. Owen Livingston
President, Grand Rapids Grinding Machine Co.

It seems as if the time has arrived when both machine tool builders and machine tool users should give some definite thought to the question of machine tool prices.

Many builders of machine tools, during the year 1921, at the bottom of the slump, canvassed the situation, and found that they could buy both their material and their labor at very great reductions from the peak cost. This was followed by what undoubtedly was a wise plan, of revaluing their finished machines, manufactured parts, and raw materials on a replacement basis. That was at that time figured as the cost of the material on hand. The loss was written off and as far as possible forgotten. On the basis of these reduced estimated costs, reduced selling prices were established.

Drastic Reductions

In some cases these were about half of what the peak selling prices had been, and in a majority of cases drastic reductions from the peak were put into effect. How many of them have advanced prices since then? And yet, how many of them can go onto the market today and buy labor or material at the prices they used as a basis for figuring those reduced prices?

If it was wise for manufacturers of machine tools to write down their inventories to replacement costs at the bottom of the depression, certainly it will be wise for those same manufacturers to keep track of current replacement costs on the rising market. With the automobile industry in full swing, feverish activities among the radio manufacturers, a very healthy demand in the car-building field, and a far from negligible demand in most other fields, those machine tool builders who are finding it necessary to again enter the active manufacturing field, find it very difficult to obtain labor having the desired degree of skill and ability. (It should never be forgotten that machine tool builders require higher degree of skill in their employees than do most of the industries with which they have to compete for labor.) I venture the assertion that the machine tool builders going into the market for labor today, will find themselves compelled to pay up to within an average of about 10 per cent of peak prices for labor, and the tendency is upward rather than downward. Reduction of material costs amounts to only a very trifling percentage in the total cost of most machine tools.

Selling at Less Than Cost Will Eventually Prove Ruinous

No sane machine tool manufacturer wants to sell equipment at less than it costs him to built it. The concern that is now selling equipment which was manufactured prior to the slump, on the basis of his depreciated valuations, established at the bottom of the slump, is fooling himself. There are unquestionably a lot of manufacturers who today are selling equipment for less than it will cost them to replace it on their floors. They will only come to realize this by either trying to manufacture it and checking up on their costs after the replacement has been completed, or by carefully checking up on present conditions both for labor and material.

There may be concerns who were getting a profit during the boom times that will enable them to make a more drastic cut in selling prices, but I am convinced that those manufacturers who were only obtaining a reasonable profit during the peak times, and who are now selling at prices which are cut more than 10 per cent under the peak selling prices, are in a fair way to find they have done business without a profit, or, in other words, that any cut in excess of 10 per cent at the present time represents a diminution of the profits that were made at the peak.

The Time to Buy

It is high time that manufacturers of all kinds should establish their selling prices, for goods on hand, on a basis of what it would cost to replace them. New business should be taken on the basis of what the probable cost of production will be at the time such new material is ready to ship.

And to the machine tool users, isn't it high time that they came onto the market, took advantage of the many undoubted bargains in the machine tool equipment that now exists, rather than to wait until the machine tool builders wake up and re-establish their prices for machine tools on a basis that will yield an adequate profit, everything considered, based on present manufacturing costs.

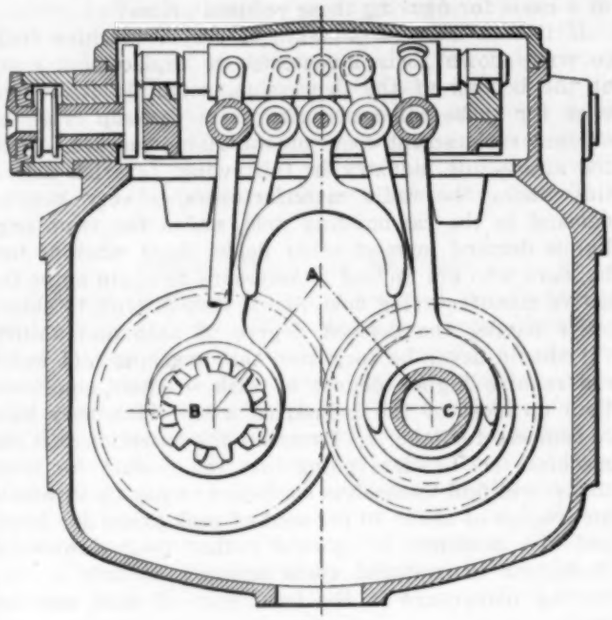


FIG.1

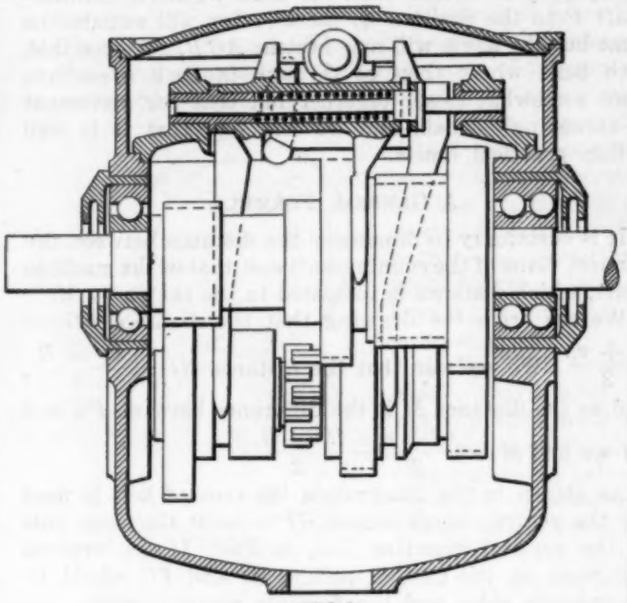


FIG.2

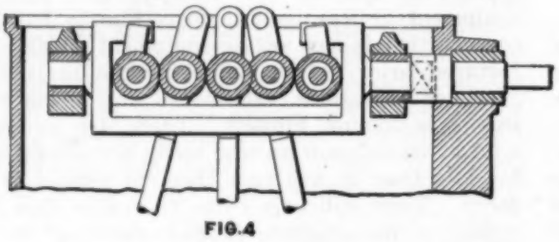


FIG.4

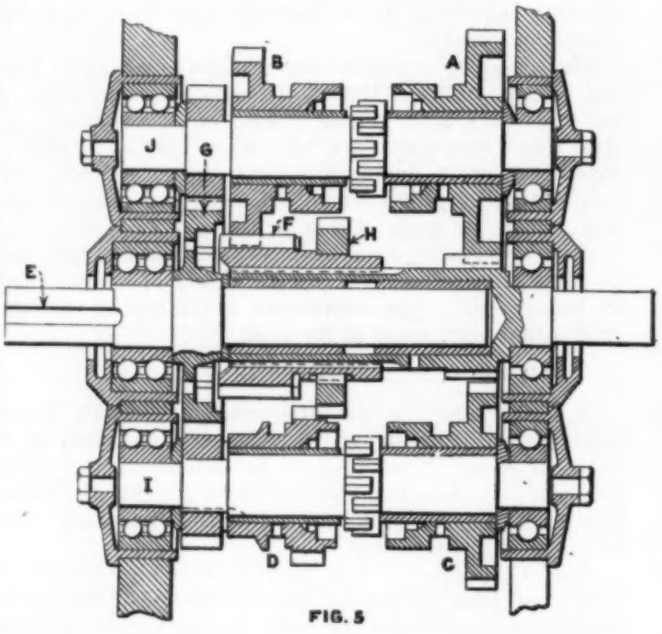


FIG. 5

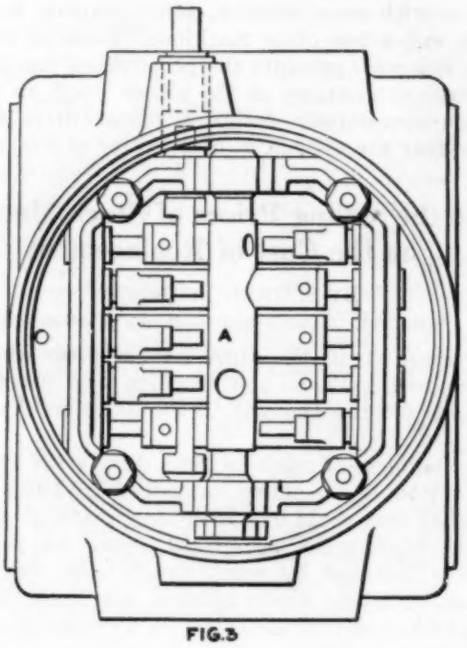


FIG.3

GEAR TRANSMISSION WITH A MECHANICAL SHIFT

FIG. 1. CROSS-SECTION OF GEAR BOX. FIG. 2. LONGITUDINAL SECTION OF GEAR BOX. FIG. 3. TOP VIEW SHOWING SELECTOR BAR. FIG. 4. DETAIL OF SELECTOR PINS. FIG. 5. CONVENTIONALIZED SECTION TO SHOW OPERATION

Gear Transmission with a Mechanical Shift

A Design Giving Four Speeds and Reverse—The Operator Merely Selects the Speed Desired, the Shift Is Mechanical

BY H. O. HERZOG

WE HAVE learned much from automobile design regarding gear shifting mechanisms, and many machines of various kinds now embody compact gear boxes for speed and feed changes. Efforts have been made to secure mechanical or electrical gear shifting, both to relieve the operator and to avoid the clashing of gears due to unskillful handling. The illustration shows a late German device, known as the Soden gear shift, and shown at the automobile exhibit in Berlin. While primarily intended for automobile use it can be adapted to other machinery as well. The gearing is completely inclosed in an oil-tight case and connected with the index or selecting lever, by wire. Fig. 1 is a cross-section; Fig. 2 a longitudinal section; Fig. 3 a view from the top; Fig. 4 a section through the top; while Fig. 5 represents two sections between the axis of the main shaft and the two back gear shafts which, for the purpose of illustration, are flattened into one plane.

The device consists mainly of the driving shaft *A*, Fig. 1, with its gears and two back gear shafts *B* and *C*, situated below it, all three shafts being almost equidistant. The driving shaft consists of two parts which telescope inside of the gear box.

The driving part of the shaft *E*, Fig. 5, enters the box at the left, the hollow end forming a sleeve around the driven end, with a bushing between. This sleeve has teeth cut on one side. On the right-hand side a pinion *F* is splined to allow a sliding motion. The teeth of this pinion engage with the clutch teeth cut in the inside of the spur gear *G*, fitting on the shaft. A pinion of larger diameter is keyed on at *H*. Clutch teeth are cut in the middle of the back gear shafts opening alternately to the right and to the left. The shape of these teeth can be clearly seen in Fig. 1. Each back gear shaft has two change gears which are bushed, and are a running fit on the shaft. There is also a driving gear keyed to the shaft. Each of the change gears has inside clutch teeth, which when the gears are slid over the corresponding teeth on the shaft, provide for their positive engagement with the latter.

For the first and second speeds, gears *C* or *D*, Fig. 5, are slid towards the center, engaging back gear shaft *I*. For the third speed, change gear *B* is clutched to countershaft *J*. The fourth speed is secured by the direct coupling of both ends of the driving shaft, by means of the clutch already mentioned. For reversing, both gears *A* and *C*, which are constantly in mesh, are moved so far towards the middle that gear *A* clutches while gear *C* still rotates loosely on its shaft.

On the top of the box, Fig. 3, is seen the mechanism which controls the clutching of the change gears. For each of the five motions a stud is provided which fits into a hole in the cylindrical shaft *A*. This shaft is connected by a wire and two small gears, the wire being operated by the index lever. The holes in the studs for the shaft are not arranged in one line, but so that they occupy different positions along the circumference. At any of the five positions of the shaft, one of the five holes becomes aligned with one of the five studs.

By pushing down the clutch treadle all five studs are simultaneously withdrawn from the shaft. When the treadle is released they return under spring pressure towards the shaft and the stud which finds a corresponding hole, snaps in. By so doing the fork with which the respective stud is connected is shifted and the chosen gear is put into engagement. A spring mechanism can be set to turn the index shaft to the angle required to bring the new hole into alignment with one of the studs, as soon as the index shaft is released. Upon pushing down the clutch the index shaft will automatically snap into the position corresponding with the position marked on the index box.

Labor Turnover

BY A. W. BROWN

One of the greatest sources of expense and annoyance in a manufacturing business is the necessity of hiring and breaking in such a large percentage of new workers, especially in the unskilled and semi-skilled classes. While this is largely due to the spirit of change among young people, the turnover is also greater than it would be if employers would use more tact, would recognize their obligations to interest, supervise and encourage their hands, and would be more careful in selecting and assigning new workers. To have 100 new names on the roll in the course of a year, in order to keep 500 hands seems ridiculous, and yet such a labor turnover is the rule rather than the exception.

The main thing is the remedy—or rather the prevention. As far as the employer is able to help, the remedy lies in the education and instruction of the working classes. Since many hands are apt to be employed more than once, even in the course of a year, the personnel card should give full data concerning each applicant and employee, so as to avoid making the same mistakes in re-hiring an undesirable worker. Every manufacturer should calculate the cost of hiring, examining, instructing and supervising workers, as well as the cost of inspecting and throwing out defective work. Besides this, he should consider the evil influence of poor workers upon their neighbors.

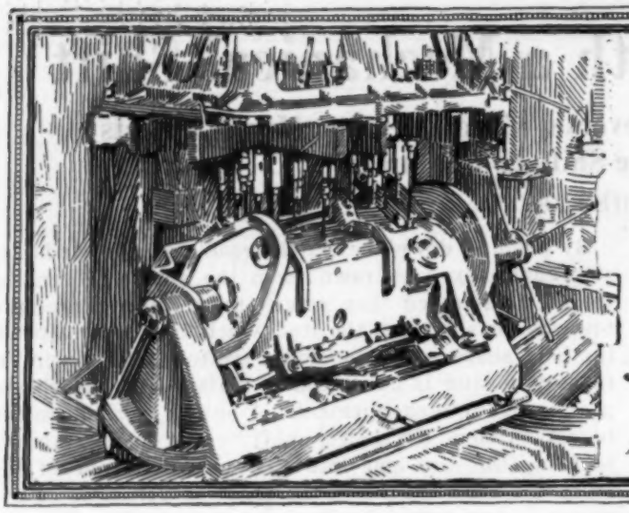
The Passaic Print Works has a sign in its employment bureau which reads:

"We seldom re-hire;
We never re-hire twice."

Self Inspection

BY ROBERT GRIMSHAW

The best worth-while inspection that the foreman—or any other man—can make, is of his own nature and his own progress or lack of progress. The oftener and more thorough that inspection, the better worth while. No haphazard inspection will suffice; no mere superficial qualitative analysis; he must ask himself just how many points out of a possible maximum he has; how many more he has gained since the last inspection; and what he is doing to get the rest of the maximum.

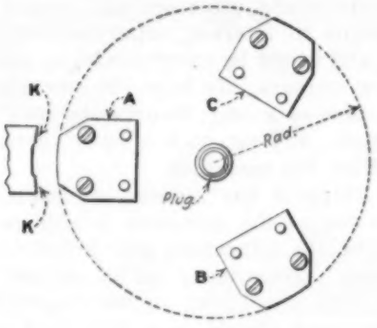


Tool Engineering

By
Albert A. Dowd and Frank W. Curtis
President and Chief Engineer
Dowd Engineering Company, New York City

Tooling of Vertical Turret Lathes and Boring Mills Continued—Adaptability of Vertical Machines—Use of Forged Tools—Sliding Fixtures and Reamers—Taper Turning and Facing

WHEN work has been machined partially in a previous setting, any other operations on the work may require it to be set up from the previously machined surfaces. As work which is handled on boring mills is usually of rather large size, the fixtures used are often of a somewhat different nature than those which would be utilized for smaller work on a horizontal turret lathe. Locating rings or plugs can often be used when they are of small diameter; but when of large size the amount of surface which would be in contact with the work prohibits their use.



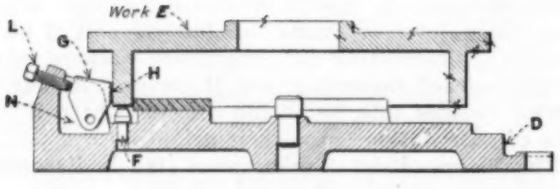


FIG. 392. SECOND-OPERATION FIXTURE FOR VERTICAL TURRET LATHE

A great deal of trouble might be experienced in placing a piece of work on a large locating ring of, say, 15 or 18 in. diameter. In order to avoid this trouble, three or four blocks can be screwed and doweled to the fixture in the proper positions, like those shown in Fig. 392 at *A*, *B* and *C*. If these blades are fastened securely to the baseplate *D* which is located on the table, the outside of the work can be easily turned to the correct diameter while on the machine. Measurements can be readily made across the central plugs. There may be cases when these locating blocks need to be hardened, but often the production is not high enough to require anything of this kind.

The work shown at *E* locates by the inside finished surface on these blocks and rests on three studs *F*, which give the work the correct vertical position. The method of driving is by means of three dogs set opposite to the locating blocks, as shown at *G*. The surface *H* which comes in contact with the work is made as shown at *K*, and it is serrated much like a chuck jaw, so that it will grip and hold the work firmly when pressure is exerted by means of the screw *L*. This example gives a very good illustration of a simple fixture of a type often useful for boring mill work.

In Fig. 393 is shown another example of a fixture used for second-operation work when the portion from which the location is to be obtained is of comparatively small diameter. The piece shown at *A* has been previously machined in the hole *B* and on the undersurface *C* and *D*. The work to be performed in this operation is the facing, turning and undercutting of the flange *E*, the piece being located from the previously finished surfaces mentioned. The fixture base *F* is of cast iron and has a central locating plug *G* which fits the hole in the table. The upper part of this plug is enlarged at *H* and made to a diameter corresponding to that of the hole *B*. The work slips over the plug and rests on two fixed studs *K*, which are located opposite to each other. Midway between them are spring jacks *L* of a type which has been mentioned in another article. The spring jacks are clamped in place by thumbscrews *M*.

The method of driving the work is by means of swinging clamps *N* of somewhat similar design to those used on the previously described fixture. There is, of course, one point which does not need to be considered when work is held on a boring mill table. This point is the matter of holding the work from falling off. Naturally as the work is laid down on the table, its own weight will hold it in place. This fact makes the design of fixtures for boring mills considerably simpler than for horizontal turret lathes.

For the authors' forthcoming book. All rights reserved.

When making indexing fixtures or those which require the turning or boring of eccentric surfaces, a horizontal turret lathe requires fixtures which are carefully balanced; but with a vertical boring mill it is unnecessary to be so particular in this regard. The table is very heavy, and if the weight is more on one side than on the other it does not make a great amount of difference. If it were found necessary to use a fixture on a boring mill which was very much heavier on one side than on another and to use this fixture continuously over a long period, it might be advisable to counterbalance it so that it would not cause inaccuracies on account of its eccentricity.

In Fig. 394 is shown a piece of work *A* having two holes *B* and *C* which are to be bored parallel to each other and some distance apart. A piece of work like this can often be handled on an upright double-head boring machine of a type in which the spindles revolve. This arrangement would allow both holes to be bored at one time, and the production obtained would undoubtedly be somewhat greater than by the method which we show. The work has been finished along the surface *D* and the six bolt holes *E*, *F*, *G*, *H*, *K* and *L* have been drilled. The two holes *E* and *L* have likewise been reamed, and they are used to locate the work for this operation.

The method of clamping is by means of straps at *M*,

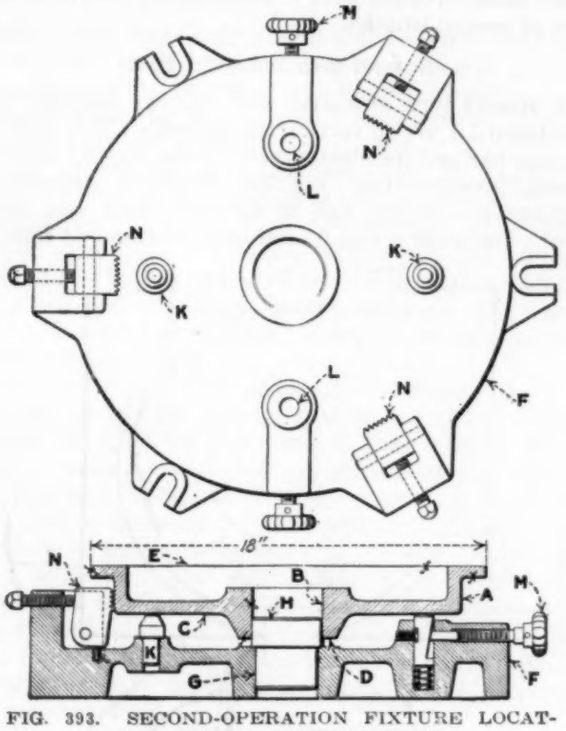


FIG. 393. SECOND-OPERATION FIXTURE LOCATING FROM A CENTRAL PLUG

N, *O* and *P*. The work rests on suitable pads with spaces between them, so that the chips will not accumulate. The sliding member *Q* is fitted to the base *R* so that it can be moved horizontally. Due to the weight of the slide the application of considerable power is necessary to move it, but this is obtained through a shaft *S* operating a pair of bevel gears and a pinion *T* which meshes with a rack *U* cut along the side of the sliding member. Heavy straps *V* and *W* are used to hold the slide down and an index pin *X* operated by a lever *Y* gives the correct location for boring the two holes.

Care must be taken when making fixtures of this kind to relieve the bearing surface of the slide so that there will not be too great an amount of surface in contact, as this would cause friction in indexing from one position to the other. If the amount of indexing necessary is small, other means can be provided which would

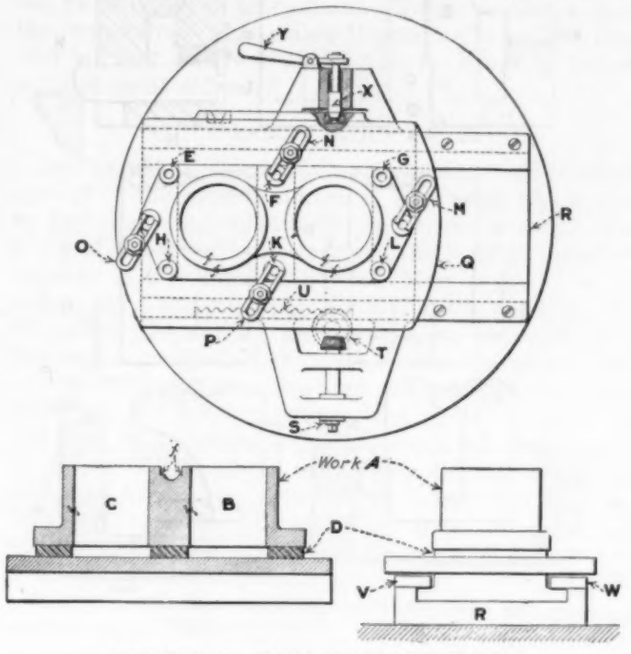


FIG. 394. SLIDING INDEX FIXTURE

do away with the necessity of the rack and pinion Even this mechanism could be simplified considerably by using a plain rack and pinion with a ratchet handle

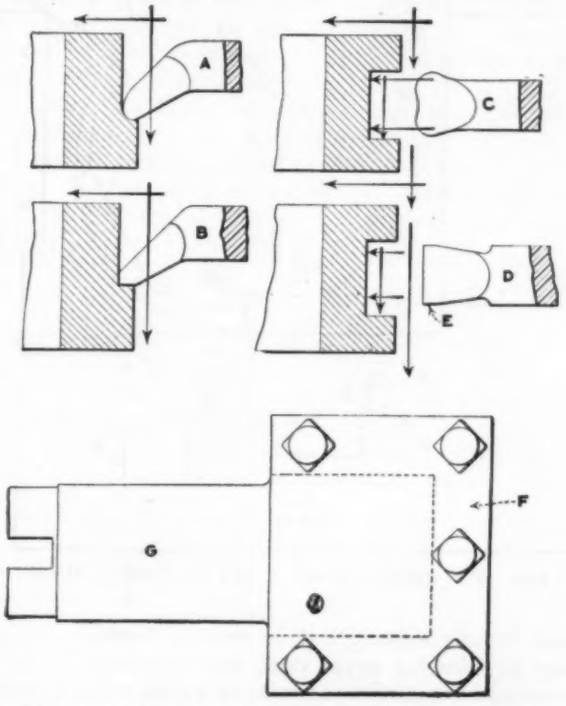


FIG. 395. TOOLS AND TOOLHOLDER FOR VERTICAL TURRET LATHE

but the latter method would take considerable more time to operate than the device shown.

We have not previously taken up the use of forged

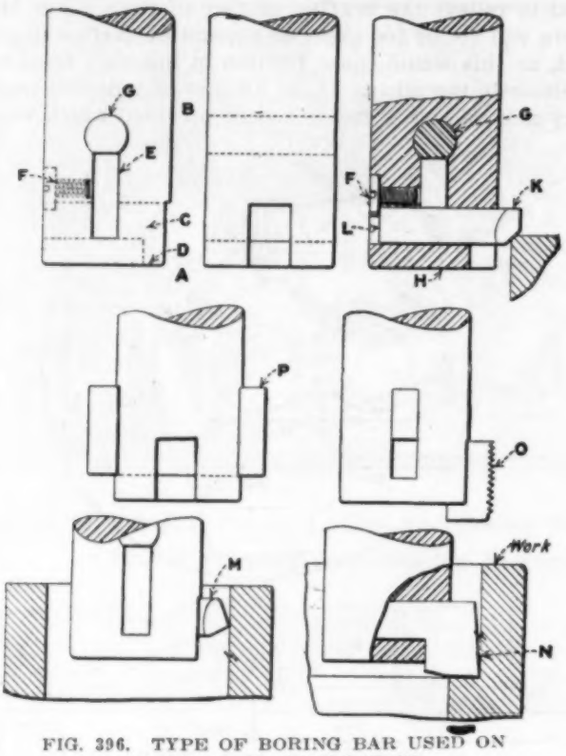


FIG. 396. TYPE OF BORING BAR USED ON VERTICAL TURRET LATHE

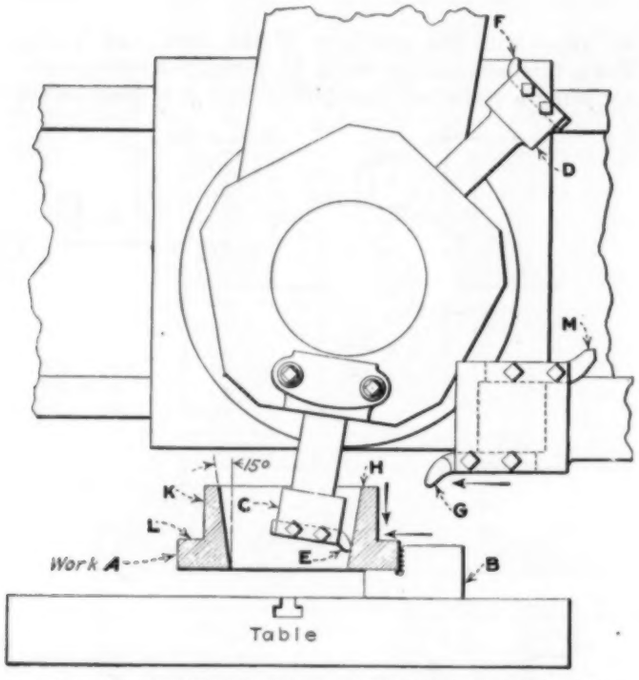


FIG. 397. GENERATING A TAPER INSIDE SURFACE

tools to any extent; but in vertical boring mill work they are used a great deal, and standards have been developed for different varieties which make it possible to handle a large amount of turning, facing and boring by the use of standard tools. A great many of the forged tools used are so designed that they will cut in more than one direction equally well. In order to illustrate their possibilities, a diagram is shown in Fig. 395 which will give a very good idea of the utility of the tools.

For example, the tool *A* is used for rough-turning and facing as indicated by the two arrows shown. The tool *B* is used for finish-turning and facing and can be used in both directions as indicated by the arrows. These tools are made both right-hand and left-hand, and they can be used in either the turret toolholder or the sidehead.

The tool *C* can be used for rough-turning, rough-facing and roughing out a pocket or groove. This tool has a double lip and will cut in any of the directions shown by the arrows. It is not used for finishing and it does not produce an exceptionally good surface, but it will remove stock rapidly and the cutting action is good. The tool *D* is used for finishing cuts or for grooving and it may be ground with a slight land at the corners as shown at *E* so that it will do a very good facing job. It can be operated in all of the directions indicated by the arrows.

These are the principal tools used in turning and facing and their simplicity is apparent, yet they are adaptable to a great variety of conditions. For the sidehead the tools are held directly in the turret toolpost, but when used in the turret a toolholder like that shown at *F* is employed. This holder is a heavy forging fitting the turret hole and slotted so that tools can be placed in it in several different positions. It is sometimes made with the stem *G* considerably longer to take care of special lengths.

Boring and Reaming Bars

A special type of boring and reaming bar has been developed for use in vertical boring mills. It is a multi-cutting bar and its construction makes it well worthy of careful consideration. Fig. 396 illustrates a number of applications of the bar to different uses and shows clearly its general features of construction. It must be

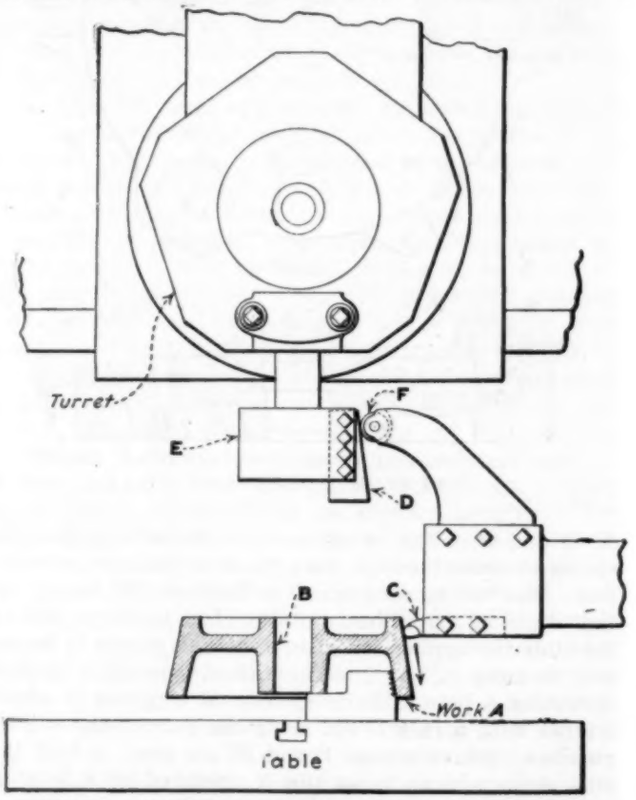


FIG. 398. ATTACHMENT FOR TURNING AN OUTSIDE TAPER

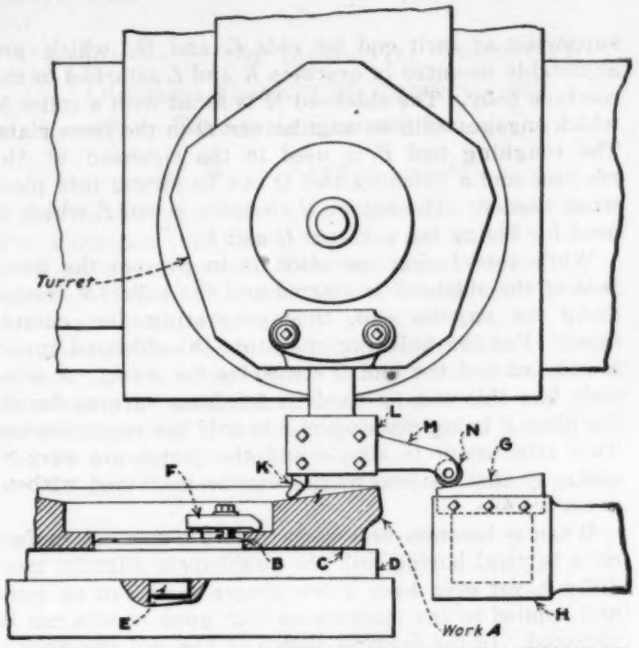


FIG. 399. FACING AN ANGULAR SURFACE BY MEANS OF A SIMPLE ATTACHMENT

remembered that boring tools and reamers used on a vertical boring mill are normally held when in use, in a vertical position, and that this position permits a type of construction to be used which would not prove satisfactory on a horizontal type of machine.

The diagram at *A* shows two views of the bar *B*, which is slotted at *C* and *D* to receive cutters of different kinds. The slot *E* is used for the reamer blade and is at right-angles to the boring tool slot which it intersects. A special setscrew *F* is used as a backing-up screw for the various boring tools and a hardened plug *G* is flatted on one side to back up the reamer blade when it is used.

The illustration at *H* shows a chamfering tool *K* in position in the bar. The end of the tool *L* strikes against the head of the screw *F*, which gives it the proper location. The tools are ground so that they fit the slot accurately, yet they are free enough so that they can be removed by hand without difficulty. The pressure of the cut keeps them in position. In boring a piece of work, after the turret position has been determined there is no change made in it while chamfering, rough-boring, finish-boring or reaming. The tools are ground to different lengths, so that various diameters can be produced according to the particular tool which is used.

The application of a boring tool is shown at *M*, and another type *N* illustrates the method of cutting a recess or a shoulder when it is necessary to face the bottom of the hole. The cutter shown at *O* is used for chasing a thread on the inside of a piece of work. All of these tools are ground to pre-determined lengths in special fixtures and the amount of finish allowance between cutters is pre-determined. The reamer blade *P* does not float in the ordinary way, but the blade itself fits the slot loosely, so that it centers itself and naturally follows the correctly generated hole. Special types of tools can be used in this bar when found necessary.

We have discussed the attachments used on a horizontal turret lathe for various pieces of work which require the generation of tapers. On the vertical turret lathe and vertical boring mill provision is made in the construction to handle a certain amount of this work without the use of special attachments. We have mentioned the fact that the head is arranged so that it can be swiveled to an angle of 45 deg. on each side of the center line. This makes it possible to set the head over so that different angles can be bored or turned without great difficulty.

Generating Inside Tapers

In Fig. 397 is shown a piece of work *A* held in chuck jaws *B* on the outside diameter. The work which is to be performed is indicated by the various arrows. The angle of the taper is 15 deg. and the head is therefore set over to this angle. The toolholders *C* and *D* carry, respectively, the roughing tool *E* and the finishing tool *F*. After the correct angle has been obtained, it is only necessary to start the down feed to the turret slide, and the tools will generate a correct taper on the inside of the work. While this operation is taking place, the tool *G* in the sidehead is used to rough off the surfaces *H*, *K* and *L*, the feeds used being in the directions indicated by arrows. The tool M is used for finishing the same surfaces. The simplicity of this arrangement will be readily seen, and the possibility of adapting it to a variety of conditions is apparent.

The work *A* shown in Fig. 398 requires the turning of the outside taper surface. This work could be done by means of the turret slide, which could be set to the proper angle; but if this were to be done a re-setting would be necessary when boring the hole *B*. In order to avoid this contingency the sidehead tool *C* is used for turning, the correct angle of the taper being determined by a special block *D* held in the holder *E* in the turret. The latter is locked in position during the operation, and the sidehead movement is controlled by the contact of the roll *F* against the forming plate.

In order to hold the roll against the plate, the binder on the sidehead is set up tightly enough, so that the head can be forced outward as the down feed of it continues. Various applications can be made of this same principle in handling tapers on a vertical turret lathe.

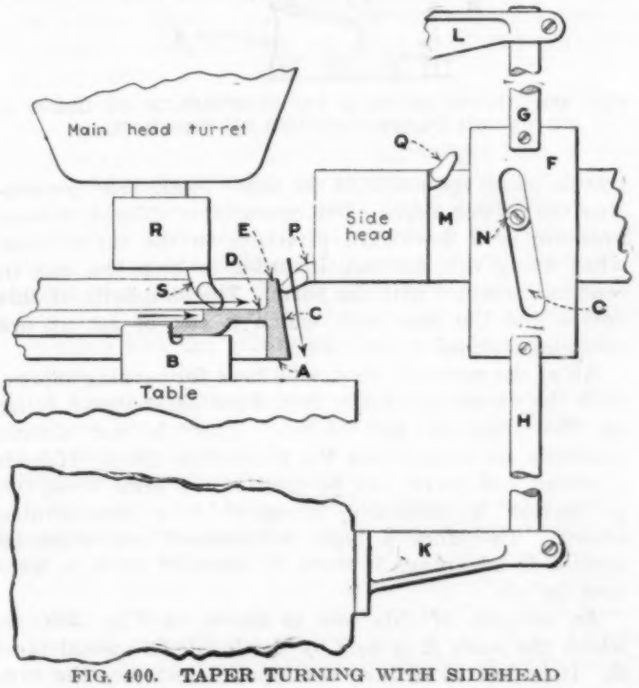


FIG. 400. TAPER TURNING WITH SIDEHEAD

There may be occasional instances when it is not desirable to tie up both turret and sidehead, as is necessary when using this method. Other means will be described later to avoid such a condition.

Taper Facing

When a taper surface is to be machined in a horizontal plane, a reversal of the principle just described can sometimes be used. Fig. 399 shows a piece of work *A* which has previously been machined at *B* and *C*. It is located on the fixture *D*, the central position of which is assured by means of the plug *E* which enters the hole in the table. The work locates at *B* and is clamped down by means of straps *F*. A taper block *G* of special form is held in the sidehead turret *H*, the latter being firmly locked so that it does not move during the operation. The tool *K* is held in the holder *L*, at one side of which is a roll holder *M* carrying a roll *N* which

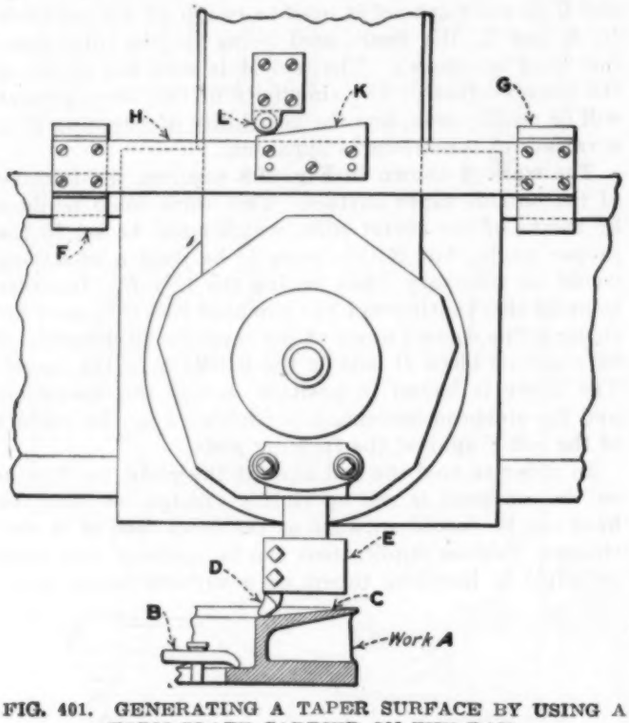


FIG. 401. GENERATING A TAPER SURFACE BY USING A FORM PLATE CARRIED ON THE RAIL

travels along the angle of the taper block, thus generating the proper angle. The operator is obliged to keep pressure in a downward direction on the turret slide when using this method, in order to keep the tool in continual contact with the form. The simplicity of this device and the ease with which it can be set up are recommendations in its favor.

All of the methods illustrated here for turning tapers, with the exception of the first, have necessitated tying up the sidehead and turret. This is not always desirable, as it decreases the production time. If both sidehead and turret can be used at the same time, the production is naturally increased to a considerable extent. Therefore a taper attachment can often be applied to advantage if there is sufficient work to warrant its use.

An example of this sort is shown in Fig. 400, in which the work *A* is held by the inside in special jaws *B*. It is desired to turn the taper *C* and face the surfaces *D* and *E* in the same setting. The plate *F* is supported at each end by rods *G* and *H*, which are adjustably mounted in brackets *K* and *L* attached to the machine body. The sidehead *M* is fitted with a roller *N* which engages with an angular slot *O* in the form plate. The roughing tool *P* is used in the sidehead of the machine and a finishing tool *Q* can be swung into place when needed. The holder *R* contains a tool *S* which is used for facing the surfaces *D* and *E*.

While this facing operation is in process the down feed of the sidehead is started and the roller *N* travels along the angular slot, thus generating the outside taper. For the finishing operation the sidehead turret is indexed and the tool *Q* completes the work. A principle like this can be used in finishing various forms, the plate *F* being made special to suit the requirements. This attachment is simple and the plates are easy to make, so that various angles can be machined without great trouble.

When it becomes necessary to face a tapered surface on a vertical boring mill the problem is slightly more difficult, yet even here a few simple parts can be made and applied to the machine so that good results can be obtained. In the example shown in Fig. 401 the work *A* is similar to that indicated in Fig. 399, but it is of much larger diameter and is handled on a different type of machine having no sidehead. The work is located on a fixture and clamped by means of straps *B* in the same manner as that previously described. The taper surface *C* is to be generated and the tool *D* held in a standard holder *E* is used for the purpose.

Two brackets at *F* and *G* are fitted to the cross-rail of the machine and carry a flat bar *H*, on the back of which a taper plate *K* is fastened. The toolslide carries a roll *L* which comes in contact with the taper plate, thus making it possible to control the angle of the taper. The pressure is kept on the toolslide in a downward direction, so as to keep the roll in contact with the form plate while the longitudinal or crossfeed of the toolslide is in use. It must be remembered when designing an attachment of this kind that the parts must all be made sufficiently strong to withstand the pressure to which they are subjected.

Tapers of various kinds may occasionally require machining, and the method most suitable is dependent largely upon the number of pieces which are to be machined, the accuracy required and the other operations which are to be performed in the same setting. It is advisable to select a method which will take these points into consideration, and if production will be greatly increased by the use of a special attachment, it can be designed according to the requirements. Many devices for taper turning have been described and the mechanical principles involved can be adapted to suit various types of machines.

Idle Equipment

By C. E. Jensen

The same remarks that apply to idle workers are appropriate for idle equipment, in so far as the employer loses the profit that the idle equipment should have earned during the time in question. But, in addition, cost calculation is rendered inaccurate, and the overhead percentage is unduly increased. A machine costing $10,000, and normally used eight hours a day, must earn 27c. an hour to cover 6 per cent interest charges alone.

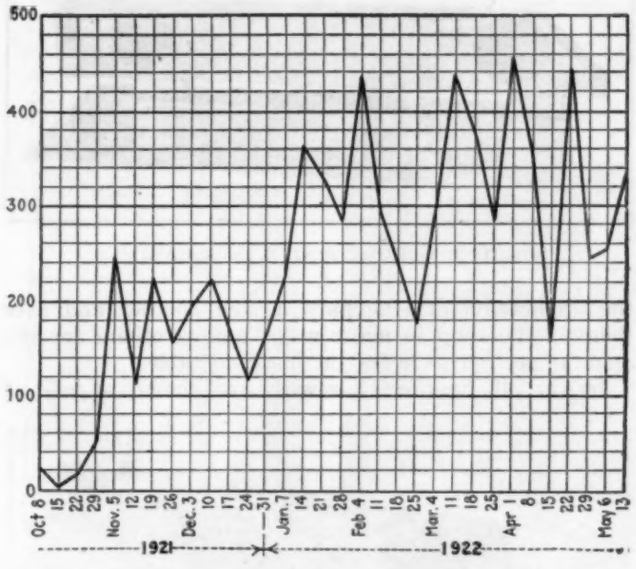
Inquiries in the Industrial Machinery Division, Bureau of Foreign and Domestic Commerce

By W. H. Rastall, Chief

An indication of the steady increase in activity of the industrial machinery division of the Bureau of Foreign and Domestic Commerce in Washington, is afforded by the accompanying chart which is a copy of one that I keep on my desk to cheer me up.

Although the curve has some rather violent fluctuations, it is encouraging to note that the general trend is constantly upward, showing that more and more people are bringing their machinery export problems to the Government for counsel.

Although this matter of the number of our commercial inquiries is one of great importance, I have come to feel that it is far more useful to persuade the manufacturer to call at this office, and for some months we have been conducting a campaign directed toward getting our machinery exporters into this building in order that they may note what we have, how we work, and how we can be used. The campaign has been very successful and is becoming increasingly so; the result is that manufacturers who come here spend anywhere from three hours to three weeks in studying the possibility of their export market.



COMMERCIAL INQUIRIES ANSWERED BY INDUSTRIAL MACHINERY DIVISION

Increasing Usefulness

To show how successful this campaign has been I might say that we had eight visitors in October, ten in November, twenty-three in December (a five-week month), sixteen in January, fifteen in February, twenty-one in March and thirty-five in April.

As the man on the job, I have come to feel that week by week we are becoming increasingly useful to the machinery manufacturing exporter, and each week brings us a little closer to the concrete export problems that really deserve consideration. We are really making far more progress than these tabular statements would indicate.

The Worker's Prospects in the Machinery Building Industry—Discussion

By A. W. Forbes

In an article published on page 511, Vol. 56, of *American Machinist*, Geo. J. Buckner disagrees with my estimate of the relative earning capacity of the college graduate as compared with that of the average young man without such training, for the reason, I believe, that he does not fully grasp my contention.

I am in thorough accord with Mr. Buckner in his opinion that the college bred boy is superior to the boy whose education is obtained in the shop—superior in every way, mentally, morally and physically—but it is one thing to admit his superiority and quite another to contend that the college should have the credit of causing or helping him to attain it.

It is only the better class of boys that go to college, and if the best boys enter college we have a reasonable right to expect that the best men will come out of it. My own opinion is that the superiority is due to inheritance and early environment and is in despite rather than because of his college training.

I am reminded of the story of the man who decided to teach chickens to swim. Being an educator instead of a farmer or naturalist this man did not notice that two of his selected "chicks" were ducklings, and began by giving them all regular practice in the water. He soon discovered, however, that only two of his brood gave promise of learning and so abandoned the others and devoted his entire attention to the favored ones.

Uuder these circumstances he was soon able to demonstrate not only that chickens were susceptible to aquatic training, but that such training was capable of changing their physical as well as temperamental characteristics, for his two favored pupils learned to love the water and grew webbed feet to help them in their swimming.

This is about what our educators are doing with boys. Those who lack ambition do not enter college; those without ability are not allowed to stay. And yet the college officials persist in comparing the average of their graduates with the average of the boys who do not enter.

If I may add a personal word to this discussion to show my position, I would say that I hold degrees from two colleges, that my brothers and sisters have studied in seven colleges and taught in four; therefore, I claim to be not entirely without inside knowledge.

While in college I was, of course, a firm believer in its advantages, and it was not until several years after graduation that my doubts were awakened by the difficulty of obtaining boys for my shop who possessed anything like the ability of those that I saw entering college.

I have not succeeded in obtaining evidence that the colleges are really doing any good, nor have I presented any definite evidence to the contrary. This is not the place to present such evidence.

We can prove the value of college training only by comparing the graduates with men of equal character and ability without the training. In view of the fact that the colleges are constantly calling upon us through taxes and personal solicitation to provide more funds, it would seem to me that it was up to these institutions to demonstrate their real value in order to justify their demands.

Ideas from Practical Men

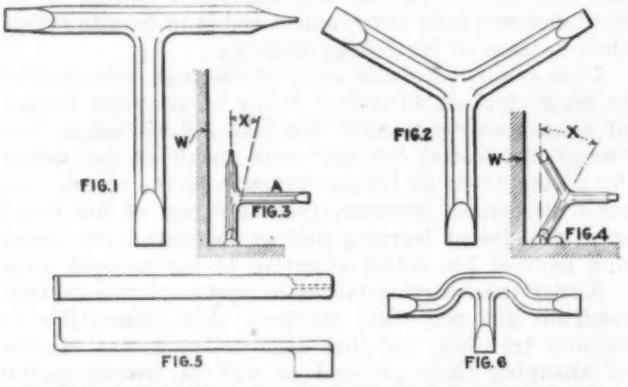
Devoted to the exchange of information on useful methods. Its scope includes all divisions of the machine building industry, from drafting room to shipping platform. The articles are made up from letters submitted from all over the world. Descriptions of methods or devices that have proved their value are carefully considered and those published are paid for.

A Handy Screwdriver

By W. S. Rowell

Under the above title on page 938, Vol. 55, of *American Machinist*, Mr. Wiley has shown us how to get results with smith work of a simple kind; on page 226, Vol. 56, Mr. Gregory showed us how not to get the effect he really wants. Mr. Gregory is right in saying screwdrivers require heavy end pressure, but wrong in designing his screwdriver so it is difficult of application.

A few years ago there came into a shop where I was employed, a tool dresser who usually made things the



TYPES OF HANDY AND UNHANDY SCREW DRIVERS

way he thought right, regardless of such little things as orders, sketches, etc. Before he was fired he was ordered to make two screwdrivers to sketch, like Fig. 1, which is usually called a T-screwdriver; when they were finished they were like Fig. 2, which might be called trifurcated. These *beautiful* things are rarely used because of their several inconveniences, though they are much like, but better, than Mr. Gregory's design.

A screwdriver working close to a surface parallel to the center line of a screw is shown in Fig. 3. The arrow shows an easily possible line of end pressure almost in line with the screw. The trifurcated screwdriver in Fig. 4 is shown encountering great difficulties in the same position. In this case the angle *X* is much greater and the blade will enter the screw slot properly only when it is parallel with surface *W*.

We all know how easily end pressure is applied to the screwdriver shown in Fig. 5. Some one please furnish it a name. The screwdriver shown in Fig. 6 makes straight line end pressure easy, but it will not work so nicely close to a surface parallel with the center line of a screw and is not so good in close quarters as the T-screwdriver.

All screwdrivers should be made from square or "hex" stock to provide ready means of applying a wrench on occasions. In these days of torch welding, the making of T-screwdrivers is easy. One should almost have a driver for each screw size.

Sine Bars for Use on Machines

By Matthew Harris

The use of the sine bar has been generally restricted to the toolroom for laying out work to be done, or for checking the accuracy of work in process or after completion. However, the Pratt & Whitney Co. has carried

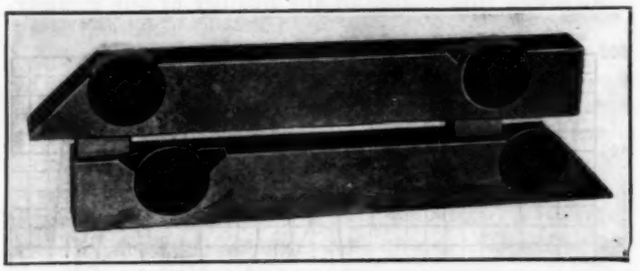


FIG. 1—A PAIR OF SINE BAR PARALLELS

the application of sine bars a step further and uses them in the shop in many ways, among others for the angular setting of work on machine tables.

In the illustrations herewith are shown a pair of

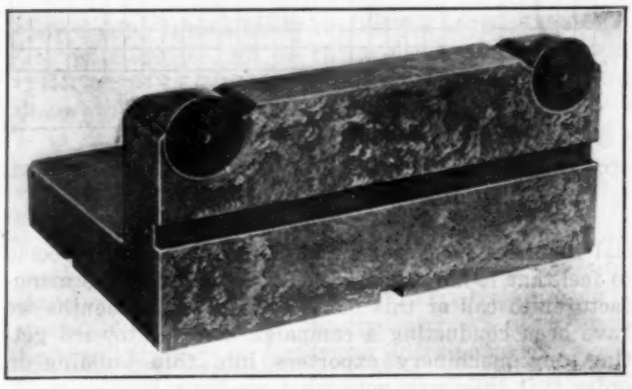


FIG. 2—ANGLE PLATE WITH SINE BAR BASE

sine bar parallels and an angle plate, the base of which has been converted into a permanent sine bar.

The use of both these devices is so obvious and their construction is so plain that no further description is necessary.

Temporary Crankpins for Use in Counterbalancing Locomotive Drivers

By J. Robert Phelps

A good start may often be gained when fitting up a pair of main wheels in the locomotive shop, if the wheels can be weighed for counterbalancing before the pins are made and pressed in. The drawing, Fig. 1, shows an arrangement for this purpose that has proved to be

very useful in this shop and has made possible a considerable saving in time and labor, and also in the distillate which we use to heat the tires for setting.

For example: If we were weighing a pair of wheels

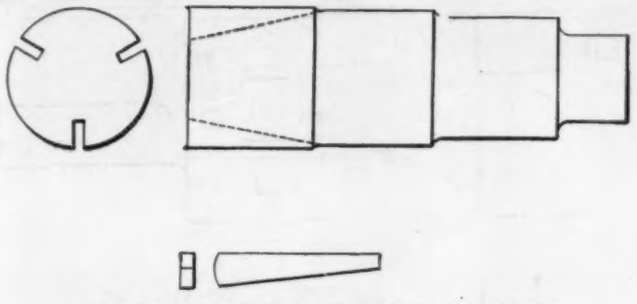


FIG. 1. TEMPORARY PIN FOR BALANCING DRIVING WHEELS

for counterbalancing in which it was required that the tires be in place when the pins were pressed in, we would have to wait for the pins to be made. Then when the wheels were put on the balancing ways we would very likely find that the tires would have to

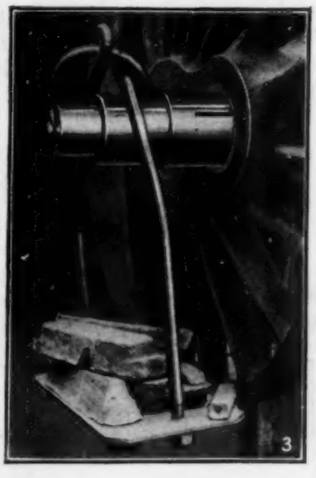


FIG. 2. THE PIN AND TAPERED KEYS. FIG. 3. A PAIR OF WHEELS ON THE WEIGHING RACK

come off again in order to get the necessary amount of lead into or out of the counterweight pockets.

With the arrangement here illustrated and described, the tires may be put on to stay, even before the pins

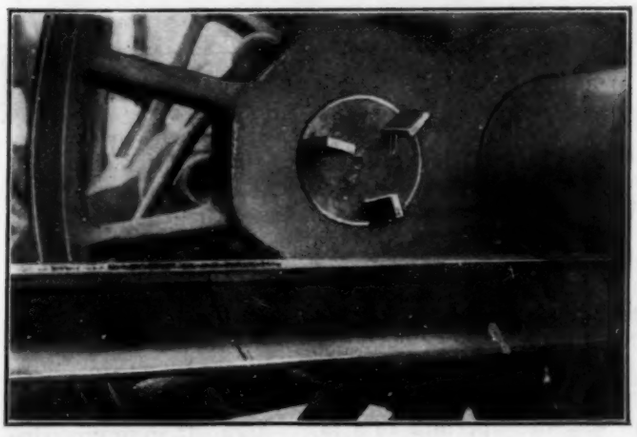


FIG. 4. SHOWING HOW THE PIN IS HELD IN THE WHEEL

are made. Two scrap pins should be fitted up in accordance with the drawing for each type of engine handled in the shop. The cut, Fig. 2, shows one such pin with the three tapered keys and an eyebolt, which latter will be found very handy in handling the heavy pin with the crane.

In Fig. 3 is shown the outside of one of a pair of wheels on the rack with the temporary pin in place and the necessary counterbalancing weights hung upon it. Note the two rollers upon which the sling bears to relieve the friction at this point. It should be understood that the eccentric arm must be in place at this stage. It was left off while photographing in order to secure a clear view.

In Fig. 4 is shown the inside of the same wheel and indicates how the temporary pin is held by means of the keys. This shoulder of the pin should be about $\frac{1}{8}$ in. smaller in diameter than the hole at the first quartering. Then as the hole is enlarged the tapered keys take up the difference and keep the pin always in the center.

Method of Locating Holes for Boring

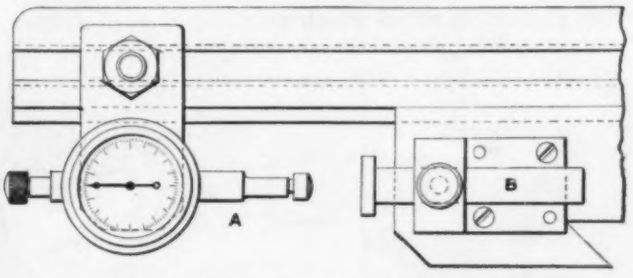
BY W. MACPHERSON

I have found the following described method of locating work for boring holes on the milling machine, such as in jig and fixture work of the ordinary type, to be convenient and accurate.

A dial indicator, shown at *A* in the sketch, is attached to a holder made to slide in the T-slot on the front of the milling machine table that is provided for the table stops. An adjustable stop *B* is fastened to the saddle of the machine in line with the stem of the indicator.

To move the table any desired amount, as when spacing from one hole to another, the indicator stem is brought into contact with the stop and the dial turned to zero. Then with the table run out to the approximate position, the exact distance is determined by means of gage blocks of the Hoke type between the stop and the indicator. Converse movements are made by using the desired combination of blocks first and then bringing the indicator to contact with the stop.

The advantage of the Hoke blocks will be apparent, as with them any dimension from 0.200 to 10 in. can be obtained in increments of 0.0001 in. The blocks,



ADJUSTABLE STOPS FOR CLOSE MEASUREMENTS

after being wrung together, are further secured by means of a tie rod through the center. This rod, especially when long lengths are required, makes the blocks more secure and easily handled.

The method can be applied to vertical measurements by using an indicator attached in some convenient position to the column of the machine.

A Special Chuck for Holding a Thin Awkward Casting

By Edward H. Tingley

The type of casting to be machined is shown in Fig. 1. It will be noted that the casting is well cored out and that the walls are quite thin. Originally a plain chuck was used to hold the piece while machining, but the taper on the rim due to draft on the pattern and the frailness of the walls, did not allow the operator to clamp it tight enough to keep it from slipping. Too much pressure distorted the piece or broke the casting. To provide the centering feature and clamp the piece tight, the chuck shown in Fig. 2 was developed and has been in use for three years, giving excellent satisfac-

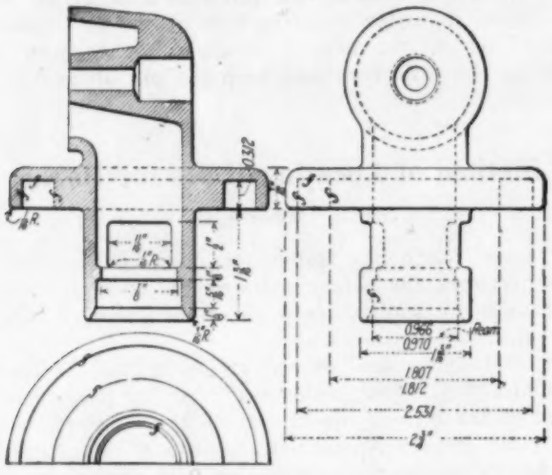


FIG. 1. THE CASTING TO BE CHUCKED

tion. The chuck is easy and quick to operate and broken or distorted castings are rare.

With the casting in the chuck, the bell-mouthed center *A*, which is held in the turret of a hand screw machine, is brought up and pushes the casting back against the stop *B* and also centers the projecting end. Tightening the scroll plate *C* clamps and centers the outside rim of the piece by the inward movement of jaws *D*. The double acting screw *E* is then tightened, bringing jaws *G* and *H* down upon the rear projection of the piece in whatever position the bell center and the jaws *D* have located it. These jaws *G* and *H*, with the screw *E*, float in guides which permit motion in a direc-

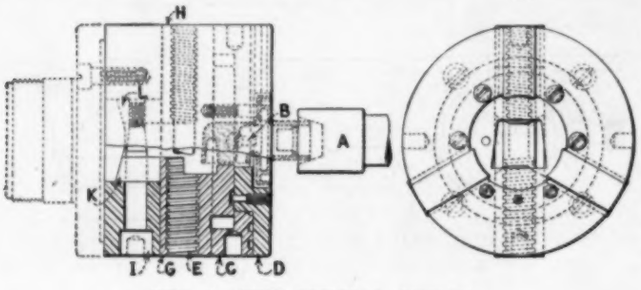


FIG. 2. THE SPECIAL CHUCK

tion at right-angles to the surfaces on the rear projection of the casting. To hold these floating jaws stationary after they have clamped the part in position, the double threaded screw *I* is tightened and pushes the two wedges *K* and *L* toward the center, thus crowding jaws *G* and *H* against the guides. With these three clamping arrangements, the casting is held securely and centrally.

The tools designed to perform the operations on the piece are shown in Fig. 3. The tool shown at *A* bores out the inner recess and at the same time breaks the

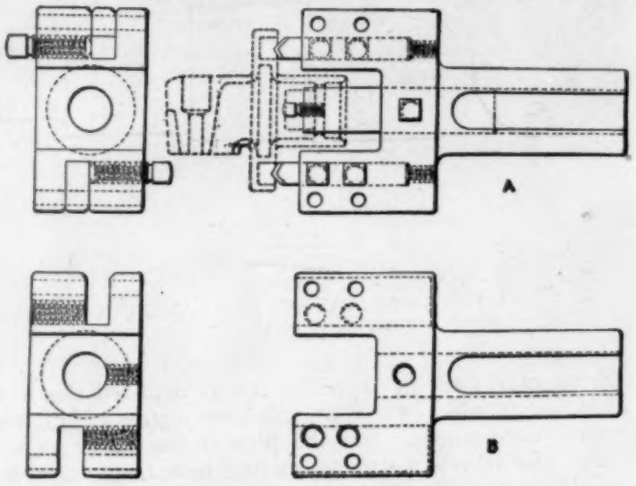


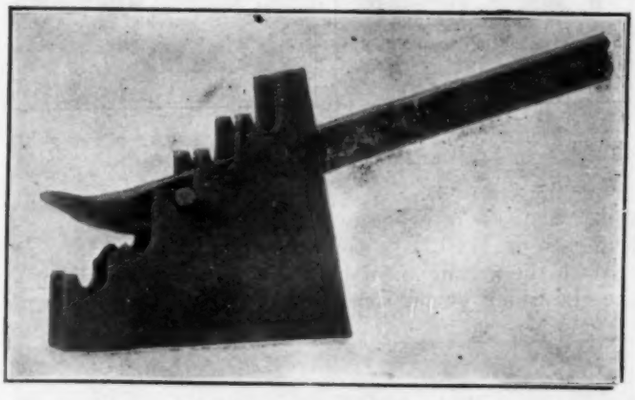
FIG. 3. BORING AND FACING TOOLS

scale on the surface where the counterbored recess will be cut. The circular tool *B*, in finishing the counterbored recess, balances the thrusts on the toolholder and the piece.

Scotch and Pinch Bar for Handling Machines

By Matthew Harris

In barring up machines to put rollers under the skids for moving, blocks of all sorts are usually hunted up to be used as scotches on which to fulcrum the pinch



SCOTCH AND PINCH BAR

bar. Every man who has handled a pinch bar in moving machinery knows that at times the scotch will slip from under the bar and let the machine down on the floor. Especially is this true when a machine is being lifted to such a height as to require the use of one or more blocks on top of each other.

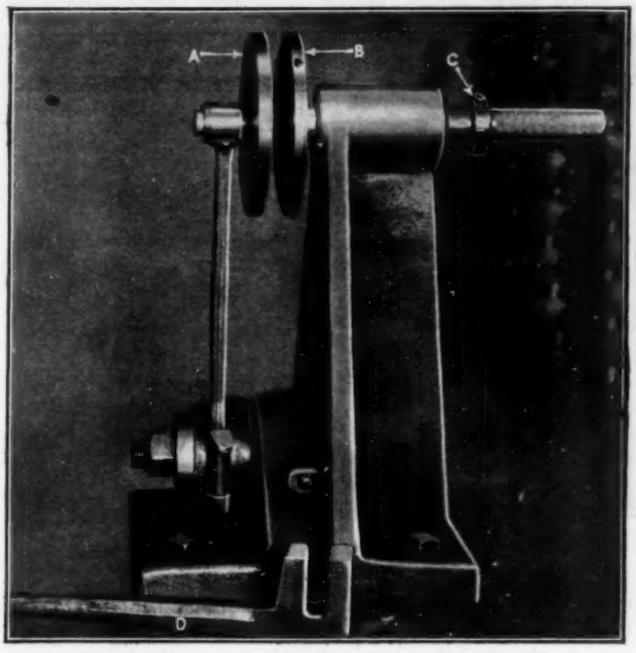
The scotch and bar shown in the accompanying illustration are used in the plant of Gould & Eberhardt, Newark, N. J.

As will be seen, the pin through the bar fits in the notches cast at varying heights in the scotch. This arrangement permits of a fairly high lift in progressive stages without the necessity for having blocks of different sizes.

Inspecting Connecting Rods

By Herbert Crawford

A connecting-rod inspection fixture used by the Peerless Motor Car Co. of Cleveland, Ohio, while resembling those used for the same purpose in other shops has one or two features which are somewhat different. The fixture is shown in the illustration and consists of the usual stand with a stud on which the large end of the rod is held by a substantial flange and nut. The large disk *A*, with a central stud representing the piston pin, is slipped into the small end of the rod and the rod is swung up into the position shown. The disk *B* is then moved forward until the collar *C* contacts with the back end of the fixture. In this position the large disk *B* should just meet the disk *A* and, if the rod is square, they should just pass each other with a full bearing on each disk. By relieving the centers of the disks so as to leave a raised edge, it is very easy to see just what contact is being made. Any slight twist is easily corrected by the wrench shown at *D*.



CONNECTING-ROD INSPECTING FIXTURE

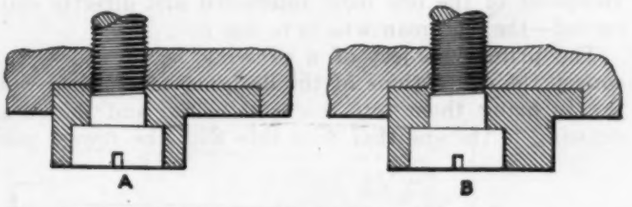
Utilizing Fixtures on Different Machines

By Frank C. Hudson

The lack of uniform dimensions in the T-slots in machine tool tables is, fortunately, being considered by a committee of machine tool builders and members of the A. S. M. E. Such standardization will be of great help to many users of machine tools and save thousands of dollars, especially for the man running a small shop.

In the meantime we must make the best of the situation and here is the way the Lucas Machine Tool Co., Cleveland, Ohio, gets around the difficulty of different width T-slots. Whenever a fixture is made for use on a milling machine or other table, the tongue is made as shown in the accompanying illustration. The tongue has a wide base set into the fixture itself, the projecting part being made to suit the machine table it is to be used on.

It will be noted, however, that the projecting part of the tongue is not central with the slot in the base but flush with one edge of it. These tongues are held in place by round-head capscrews located centrally with the narrowest tongue as seen at *A*. This prevents getting the tongue in the wrong way, which sometimes



INTERCHANGEABLE TONGUES FOR FIXTURES

counts when the fixture is designed to overhang the table on one side.

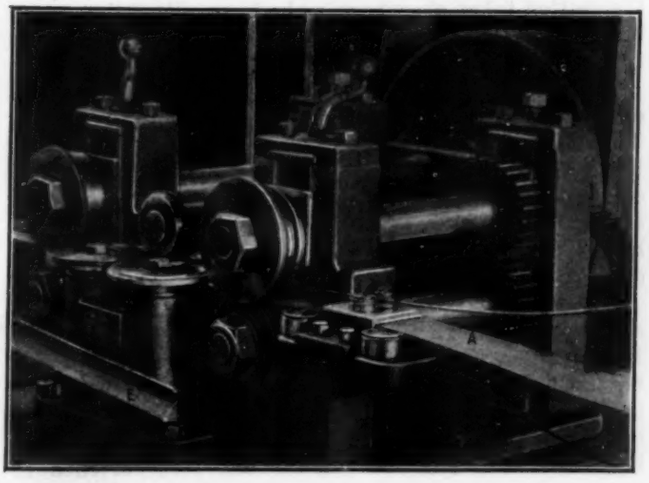
Should it be desirable to use this fixture on another machine at any time, another tongue is made as at *B*. The base is of course the same, but the tongue is wider to fit another designer's idea of a T-slot. The screw location is the same as before and insures getting either tongue in as it should be.

This is a very clever scheme for making the best of our present hodge-podge of T-slots and saves a lot of time and expense.

Wiring Fender Strips

By R. E. Marks

Here is an interesting little special wiring machine I ran across in the fender shop of the Winton Motor Car Co., in Cleveland, some time ago. It is for rolling wires into the edges of a rather narrow strip. The wires are on opposite sides of the strip, the edges of which are turned in opposite directions. The steel strip feeds in from *A* with one wire above and the other below. The wires feed through the rollers shown and the strip is passed between them at *B* and *C*. The rollers at *D* support the upper wire while the edge of the strip is being turned over it. Part of a completed strip is shown at *E*. It is interesting to note how a designer who understands this sort of work can arrange a few rollers and gears in a compact frame and secure just the result he desires.



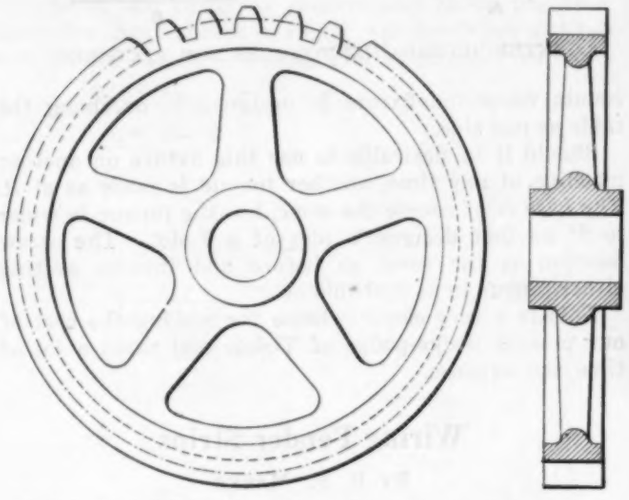
ROLLING IN TWO WIRES ON OPPOSITE SIDES OF A STRIP

Best Way to Show Section Through Ribs

BY F. L. SYLVESTER

On page 787 of *American Machinist* an article by Aloysius Wilks under the above heading invites discussion. As a preliminary measure it would seem to be well to consider the purpose of a drawing from the viewpoint of the one most interested and directly concerned—the workman who is to use it.

The primary object of a drawing is, of course, to convey the conceptions of the designer to the men who are to bring them into material being, and the ideal drawing is the one that does this with the fewest pos-



SHOWING A SECTION WITH FEWEST POSSIBLE LINES

sible lines consistent with complete and comprehensive information.

Judged from this standpoint it would seem that Mr. Wilks, in selecting the object with which to illustrate his remarks, had chosen unfortunately. Of his three views showing various ways of indicating a section through the middle of an angle plate having a rib in it he chooses the third method which really shows the section taken elsewhere, as he has omitted the cross-hatching entirely where it should have passed through the rib.

In order the better to "keep on good terms with the efficiency expert" and "put one over on old Father Time," as he expresses it, why not omit the cross-hatching altogether and show two views of the object; one an end view as is his third example and the other a front view as shown in the lower left-hand corner of his sketch, the two views, of course, to be arranged in correct relative position on the drawing.

As an instance of what is right or best in displaying a section through a rib, I am submitting the accompanying drawing, which shows the section of a gear wheel having five arms, or spokes. It is clear that the drawing does not represent the gear correctly according to theory, for this would demand that the upper spoke be cross-hatched and the lower one foreshortened to indicate its angular position.

The patternmaker may, for the sake of getting a laugh on the draftsman, criticize such a drawing as not being theoretically correct, but it does, nevertheless, give him the clearest representation of the object desired, and with the fewest possible lines, which is what he really wants.

Simple Guard and Feed for Punch Presses

BY I. B. RICH

The illustration herewith shows a guard and a simple feed for a press, the latter only good for flattening work as shown.

The press guard at *A*, Fig. 1, lifts the operator's hand out of harm's way before the punch can catch it. It is a simple device, the guard being raised by the small

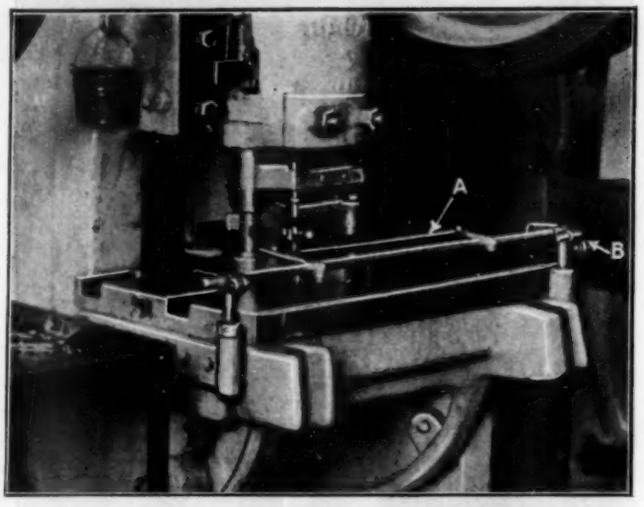


FIG. 1—A SAFETY GUARD FOR A PUNCH PRESS

crank *B*, connected to the mechanism that runs the press. This guard has an easy motion which prevents injury to the operator even when it forces the hand out of the way, differing from some of the older guards in this respect. It has proved very efficient in this shop.

The feed shown in Fig. 2 is extremely simple, consisting of a piece of sheet metal bent up as at *A*. It is only necessary to place the washers to be flattened on the incline and they naturally slide under the ram

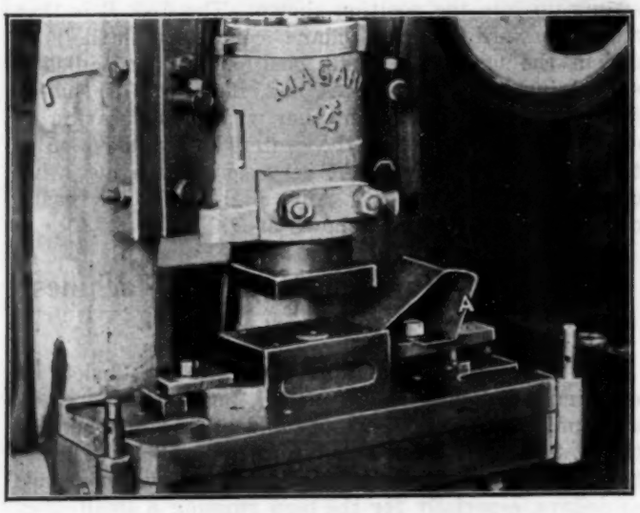


FIG. 2—A SIMPLE PUNCH-PRESS FEED

to be flattened at the next stroke. They are poked out of the way with a thin piece of sheet metal.

These devices are used by the Monroe Calculating Machine Co., Orange, N. J. The presses are painted white, even though they are in a very light shop and are kept remarkably clean with apparently little effort.

A Good Casting from a Bad Pattern

BY M. E. DUGGAN

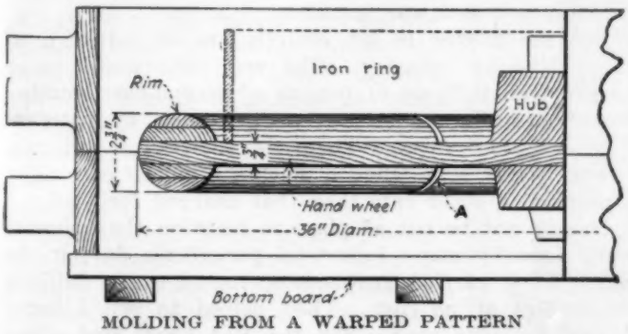
Did you ever make a pattern for a wheel—gear, band, fly, hand, or any old kind of wheel—with a web center instead of spokes?

If so, you were probably very careful to have the web flat and true, and you glued the two, three, or four pieces that made up the web nicely and firmly together to make sure that they would retain their original shape. Then you built up on each side of this web a double row of segments to form the rim, well glued, and perhaps additionally secured with nails or screws; and then you turned up and finished this pattern in a way to do any good pattern maker proud.

When the pattern was returned from the foundry you stored it in the average kind of pattern loft under the roof where it was subjected to all degrees of temperature and perhaps to dampness, so that when you wanted it the second time, very likely for a rush repair job, you found it warped and twisted almost beyond recognition.

Did all these things ever happen to you?—and if so, what did you do about it? Here is the way it was handled in one such case.

The warped pattern was sent to the foundry with instructions to make the best of it. The rim was sawed through at eight places as shown at *A*, and the pattern bedded in molding sand in the flask. A heavy ring of iron (a circular flask) was then laid upon the pattern and by hammering and manipulating the ring and pattern the latter was eventually coaxed to lie flat so that the iron ring would bear upon the web all around.



MOLDING FROM A WARPED PATTERN

Enough sand was then shoveled into the flask to hold the pattern, and the iron ring removed.

More sand was then shoveled in and the drag side of the mold completed, the mold rolled over and the cope side finished. A very satisfactory casting resulted.

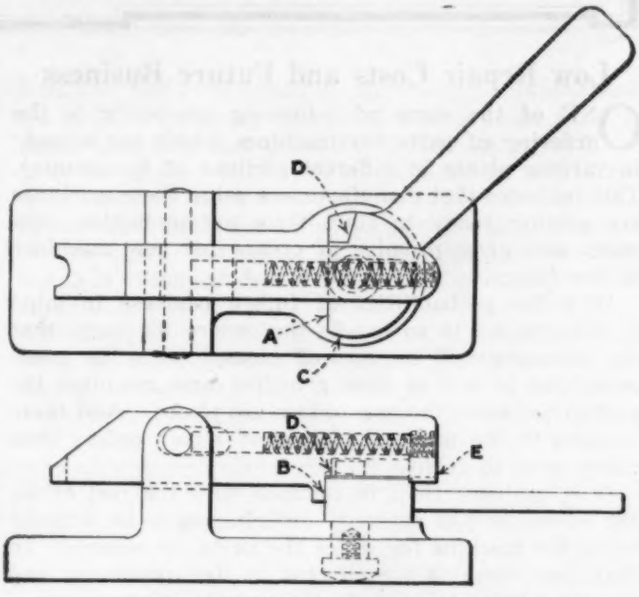
Double-Action Clamp for Jigs and Fixtures

BY R. F. MOORE

The double-acting clamping device here shown and described is a very simple and effective means of applying the clamping pressure to work held in a jig or fixture, and may easily be incorporated into such tools. When the writer saw the device it was a part of a drilling jig, and it attracted his attention because of its easy and rapid action.

The first movement of the handle causes the cam surface *A* to push the clamp forward by reason of contact with the lug *B* of the clamp. When point *C* of the cam has reached the lug and there is no further forward movement of the clamp, the face cam *D* comes under the heel of the clamp at *E* and applies the clamping pressure, all in a single movement.

The stud upon which the handle turns extends a suffi-



DOUBLE-ACTING CLAMPING DEVICE

cient distance above the latter to enter a slot in the under side of the clamp to prevent any sidewise movement. A suitable spring returns the clamp to its original position when the handle is turned back.

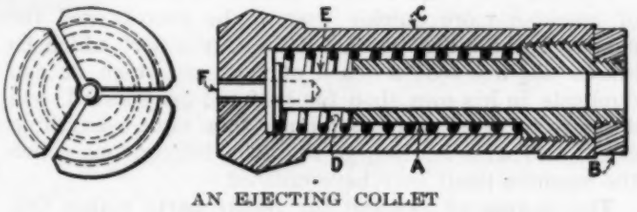
Ejecting Collet for Automatic Screw Machines

BY E. W. LARUE

In second operation work on automatic screw machines, the work is generally fed from a magazine into the collet, and often a means must be found for ejecting it when completed.

An ejecting collet for use on a No. 00 B. & S. automatic screw machine is shown herewith.

Parts *A* and *B* are made of tool steel and hardened.



AN EJECTING COLLET

Part *C* is a standard double-angle collet, hardened, tempered and tapped out at the rear end to receive part *A*. Parts *E* and *F* are tool steel and the spring *D* is made of music wire and tempered. Part *F* is a light drive fit in part *E* which in turn is a sliding fit in part *A*. After part *A* has been screwed into the collet the proper distance, the locknut *B* is screwed tightly in place.

The work is forced into the collet against the pressure of the spring by the turret and magazine mechanisms and the collet tightened by the usual cam. When the collet is loosened the work is ejected by the plunger *F*.

Editorial

Low Repair Costs and Future Business

ONE of the signs of returning prosperity is the ordering of parts for machines which are already in various plants in different sections of the country. This indicates that manufacturers using these machines are getting ready to start them on production once more, and gives promise of orders for new machines in the future.

With the probabilities of future business in mind it behooves us to so handle the orders for parts that the customer will be so well pleased with his treatment that he will at least give the same machines the preference when the new orders are placed. And there is more to the proper handling of repair orders than many seem to realize.

It is probable that, in common with the rest of us, the customer has deferred ordering until he actually needs the machine for which the parts are ordered. In that case time is an element to be considered and prompt service will create a favorable impression. If an appreciable delay is necessary, a courteous letter explaining the reason will help to keep him good natured. Silence, which is constructed as ignoring his order, is a great barrier to future relations. There is a whole lot more to letter writing in regard to repair part orders than appears on the surface. Such orders generally do not permit personal contact of buyer and seller and the letters have to be the best that can be written on that account.

The question of price is also to be considered, as this plays an important part in maintaining pleasant relations. No man expects to get repair parts for nothing but everyone resents being "done," to use a very expressive slang phrase. And too many manufacturers of machinery of all kinds, from coffee mills to automobiles, seem to feel justified in charging from two to ten times the value of a part to be used in making repairs.

Nothing will shift a man's allegiance from one make of machine more quickly than to be overcharged for parts. To be billed twenty dollars for a part which he knows did not cost a tenth of that, or which he can duplicate in his own shop for half the price asked, will do more to "rile" a man's temper than almost anything else. And with it often go the good impressions which the machine itself may have created.

The increasing demand for repair parts makes this an opportune time to carefully consider this phase of the sales problem. Now is the time to cultivate customers who are now using your machines and to handle their repair orders so that your machines stand first in their minds when the time comes to order more. It will pay to go over your price list on spare parts and ask yourself whether they are reasonable, when all phases of the question are considered. You must, of course, figure cost, overhead and the expense of carrying a reasonable stock. But it will pay to revise any fancy prices and to avoid the practice of some to get all they can out of repair parts. Prompt service and fair prices of spare parts go far toward keeping old customers lined up for all new orders in your line.

A Bill to Relieve Excessive Postal Rates

REPRESENTATIVE Clyde Kelly of Pennsylvania has introduced a bill for the repeal of a portion of the excess postage rates which were imposed as a measure for war revenue. This would not put the rates back to a pre-war basis, but only remove the last two, of the *four* increases imposed. Even the rates proposed by Mr. Kelly are 175 per cent higher than those paid before the war.

Mr. Kelly points out that the continuation of these high rates has seriously affected the entire publishing industry. This industry, he contends, is just as essential to business prosperity as are the highways and waterways. Both are channels which aid commerce in securing its necessary interchange of products and ideas. This applies just as much to the advertising as to the reading pages, as both chronicle advance in industrial achievement.

It must be remembered that the postal rates on publications were advanced 325 per cent over pre-war rates. The increase has not been apparent to subscribers because in most cases the cost has been borne entirely by the publishers. It should also be recalled that every other item carried in the war measure which imposed this great increase in postal rates, has been either modified or repealed. Only the publishers have been compelled to continue to pay the maximum rate imposed as a war measure.

But the matter is not entirely one of injustice to the publishing industry. The war time postal rates have driven millions of pounds of second-class matter from the mails and into private channels of distribution at lower rates. There is something radically wrong in our laws when a private company can make a profit at a lower rate than that charged for mail.

It may not be out of place to mention the valuable work done by many industrial periodicals during the war. They carried government messages to millions of readers at no cost. They helped to sell Liberty Bonds, to raise money for the Red Cross and other necessary purposes. They were of great aid in securing proper personnel in many departments. Their editors were at the government's disposal for special researches and the gathering and dissemination of special information, and at no cost for either salaries or traveling expenses. Furthermore, their publications may be called the source of both first-class and fourth-class mail. In other words, among the best and biggest customers of the Post Office Department themselves, they stimulate the use of the mails by other customers.

The publishing industry is not asking for special privileges. It merely asks to be relieved of special war charges as has been done in every other industry. It asks this that it may still better serve its millions of readers throughout the country.

The proposed bill still leaves the rates 175 per cent above the pre-war figure. We are sure you agree that this is sufficient to cover increased cost of handling the mail. A request to your Representative to consider House Bill No. 11,965 favorably will help to secure the desired change and be mutually beneficial.

Shop Equipment News

P. & H. No. 3-T Horizontal Boring, Drilling and Milling Machine

The Pawling & Harnischfeger Co., Milwaukee, Wis., has recently developed the No. 3-T horizontal boring, drilling and milling machine shown in Fig. 1. The machine is built for tool work especially. The square lock, narrow guides with taper gibs and heavy construction of the spindle, saddle and column are intended to give the accuracy necessary for such work.

All operating levers and handwheels are within easy reach of the operator and conveniently arranged, as can be seen in Fig. 2. The starting, stopping, reversing and changing of feeds or speeds, by either hand or power, are controlled by the operator without moving from his position. It is impossible to have two conflicting speeds or feeds in action at the same time.

The column is of box section and is tongued and grooved to the bed. The spindle-carrying saddle is of box section. All drive gearing and shaft bearings are phosphor-bronze bushed, and the main spindle sleeve bushing is phosphor bronze scraped to a slight taper for taking up wear. The saddle is guided on the column by a narrow guide at the front, nearest the cutting pressure. Two steel taper gibs are provided to allow adjustment for wear. The saddle can be raised or lowered on the column by either hand, power feed, or quick traverse. It is counterbalanced.

The spindle is forged from high-carbon hammered alloy steel. Power is applied at the front end, and the feed mechanism, consisting of a rack and pinion, is located at the rear end. This construction provides the spindle with large bearings at both front and rear. The feed change mechanism consists of spur gears and positive clutches, actuated through a frictional worm wheel.

The spindle can be driven through either a small plate with a wide-face, coarse-pitch gear, or a larger faceplate with an internal gear and tapped holes for the attachment of milling cutters and milling heads. The spindle driving sleeve has adjustable bronze taper shoes to take up wear due to the sliding of the spindle in the sleeve.

The bed is a one-piece box-section casting, and contains chutes for the quick removal of cuttings. It contains the feed, feed distributing and the rapid traverse mechanisms. The table carrying the platen is a box casting, and has a narrow guide and taper gibs for taking up wear.

The driving pulley is 14 in. in diameter, carries a 3-in. belt, and runs at 350 r.p.m. Sixteen spindle speeds are provided, ranging from 14.5 to 225 r.p.m. with the small faceplate, and from 8.7 to 136 r.p.m. with the large faceplate. Power is transmitted by belt direct from the line shaft to a pulley on the machine itself. Provision is made for attaching a motor at the rear of the machine. For motor drive, a 5-hp. constant-speed motor is recommended, with a speed of 1,200 to 1,400 r.p.m.

Eight geared feeds are obtainable, ranging from 0.005 to 0.288 in. per revolution of the spindle for boring, and from 0.0084 to 0.44 in. per revolution of the spindle for milling when using the small faceplate.

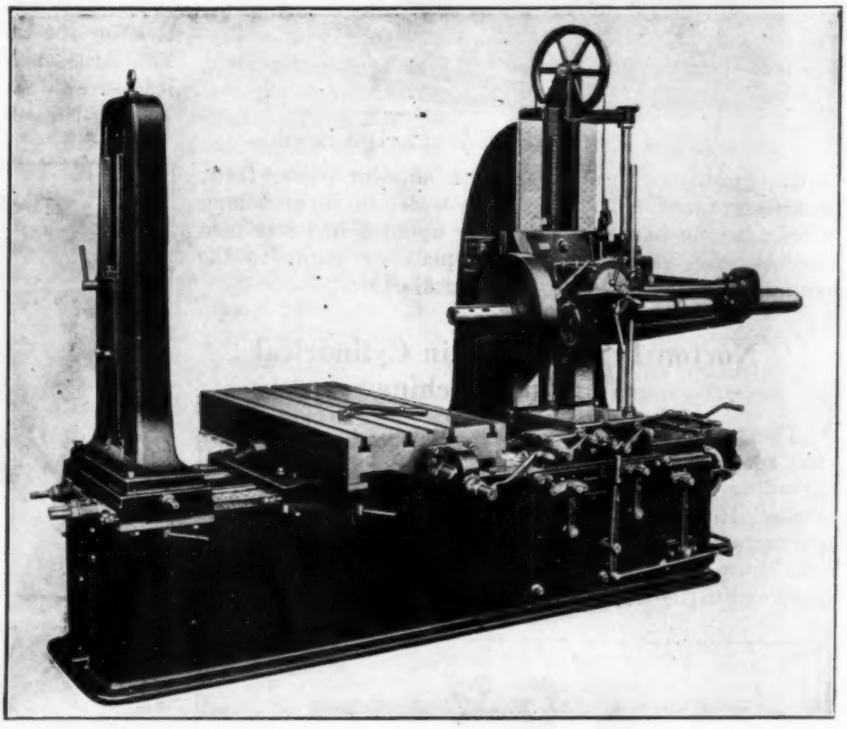


FIG. 1—P. & H. NO. 3-T HORIZONTAL BORING, DRILLING AND MILLING MACHINE

Specifications: Diameter of spindle, 3 in. Taper hole in spindle, No. 5 Morse. Travel of spindle, 23½ in. Greatest distance between faceplate and outer support for boring bar, 5 ft. Greatest distance froom top of platen to center of spindle, 28 in. Size of platen, 24 x 54 in. Crossfeed of platen, 36 in. with automatic trip. Weight, approximately 11,300 pounds.

When using the large faceplate, the feeds range from 0.008 to 0.48 in. per revolution of the spindle for boring, and 0.013 in. to 0.73 in. per revolution of the spindle for milling.

The boring bar support can be removed from its base without disturbing any of its mechanism. Helical gearing is used between the support screw and the saddle screw. A thread-chasing attachment that will cut threads varying from two to sixteen per inch and to any length within the capacity of the machine can be furnished. The following attachments can also be supplied: Circular swiveling table, 24 in. in diameter, 6 in.

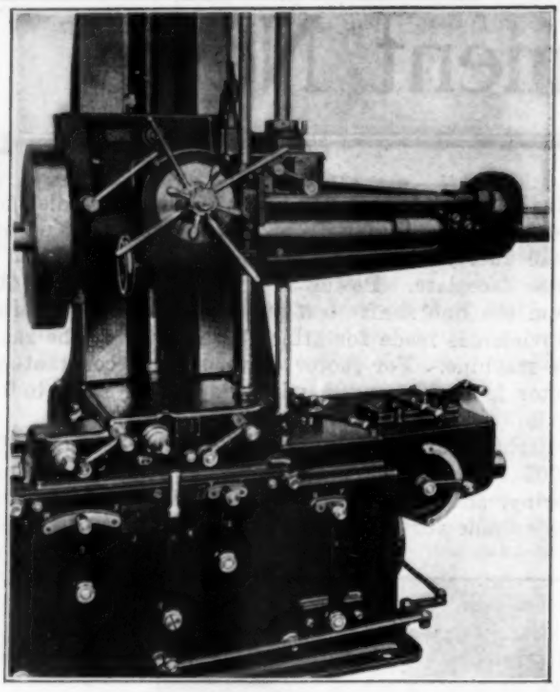
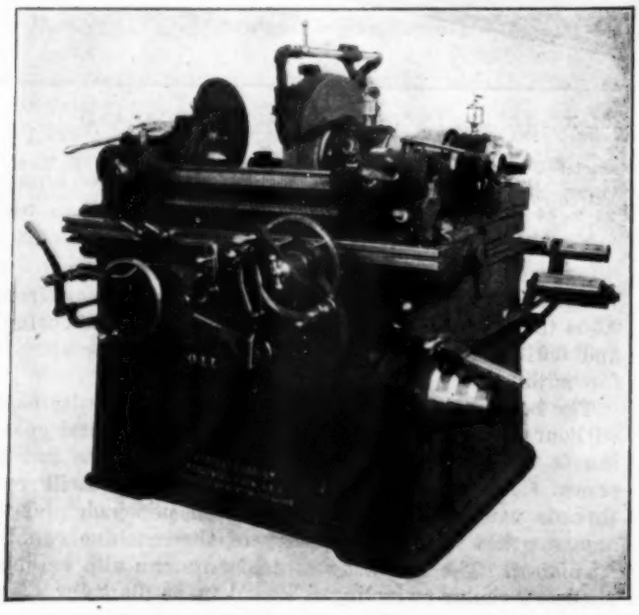


FIG. 2—CLOSE-UP VIEW OF OPERATING LEVERS

thick, graduated to minutes, with hand or power feed; auxiliary table, 5 ft. long, 5 in. wide, to support long work; boring bars, any diameter up to 3 in.; star-feed facing head to bolt to the faceplate or clamp to the spindle, for facing up to 16 in. in diameter.

Norton 10 x 18-In. Plain Cylindrical Grinding Machine

The machine shown in the accompanying illustration has recently been added to the line of plain cylindrical grinding machines made by the Norton Co. of Worcester, Mass. This machine is very similar in general characteristics to the other 10-in. Norton grinding machines, and is adapted to handling short work of the type ordinarily performed on such machines.



NORTON 10 x 18-IN. GRINDING MACHINE

The length of work that can be accommodated is 18 in., which gives suitable capacity for handling a large number of parts used in automobiles and accessories. The specifications of the headstock, footstock, wheel-slide, table-speed frame and wheel-feed mechanism are the same as in the former models of the 10-in. machine. The floor space, however, is considerably reduced because of the shortened distance between centers.

The wheel spindle is 28¾ in. in length and can carry a standard grinding wheel up to 18 in. in diameter. Four speeds are provided for the table. Each tooth on the index wheel represents a feed of the wheel of 0.00025 inch.

Steptoe "Standard" Engine Lathes

The John Steptoe Co., Cincinnati, Ohio, has recently brought out a series of engine lathes in both plain and quick-change types and known as the "Standard." The sizes made are 14-, 16-, 18- and 20-in. swing. One size of the quick-change type is illustrated herewith.

The beds are of the box-section type and are recessed to allow the tailstocks to overhang at the extreme ends. The lathes are equipped with feed rods in addition to lead screws, so that the lead screws are used only when cutting threads. The surfaces of the beds to which the

STEPTOE "STANDARD" QUICK-CHANGE ENGINE LATHE

quick-change gear boxes and lead screw hangers are attached are slotted to receive tongues in the boxes and hangers, insuring proper alignment. The racks are in one piece.

The aprons are of the box type, allowing the use of double supports for the gears and shafts.

All gears in the aprons, as well as the change gears, are made of steel cut from the solid bar.

In the quick-change lathe the entire range of threads and feeds is provided for by the operation of but two handles.

The 18-in. lathes are furnished with cabinet legs under the headstock, and the 20-in. lathes with cabinet legs at both ends. Lengths of beds for the 14- and 16-in. lathes are 6, 8 and 10 ft.; for the 18- and 20-in. lathes, 6, 8, 10, 12, 14 and 16 feet.

The regular equipment of each lathe includes two faceplates, steadyrest, follow rest, graduated compound rest, gear guards, and countershaft with two friction-clutch pulleys.

Taper attachments, thread indicators, draw-in attachments, and motor drives can be furnished as extras.

Pratt Grinding Gage

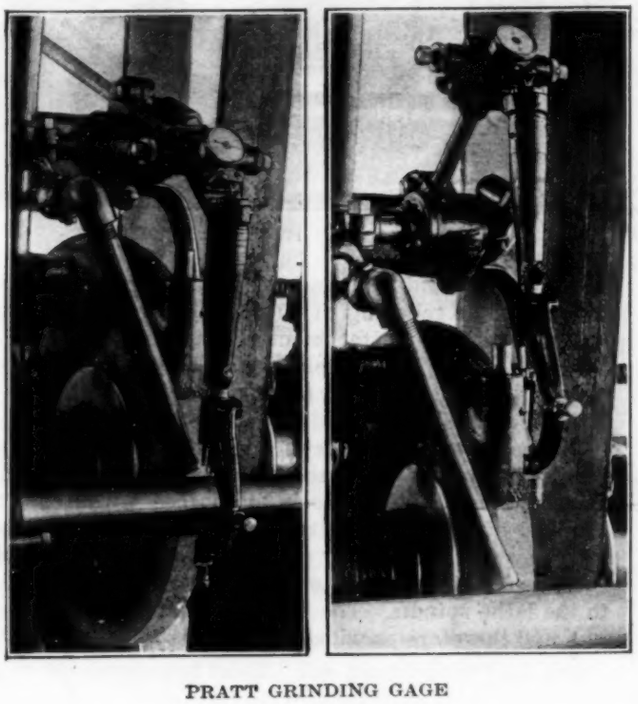
A gage for determining the size of work being ground, without stopping it to use snap gages or micrometers, has recently been placed on the market by Fred J. Pratt, 627 Wayne St., Detroit, Mich. The gage consists of a cast-iron body in which a plunger and spring are housed. On the top of the body an indicator is mounted, and heads to fit the work can be interchanged at the bottom. Each head has a range of 1¼ in., and sizes up to 5 in. can be supplied from stock.

The gage is shown in the operating position at the left of the accompanying illustration. There are three diamond contact points, two of which are mounted in the ends of adjustable screws and the other in the end of the spring-actuated plunger. The screws are interchangeable in the heads. The diamonds have a conical form and do not mark the work. A very light spring pressure is all that is needed to keep the diamond points in contact with the surface being ground.

It is stated that tolerances of 0.0001 in. can be maintained by the use of the device. The indicator, which is set at an angle of 30 deg. at the top of the column, is plainly visible to the operator, so that he can watch the progress of the grinding as the work is reduced.

The gage is hung between cone-pointed screws in a fork which is adjustable to any position, and which is made so that the gage can be raised and lowered. At the right of the illustration the gage is shown in the raised position and out of the way, so that the work can be removed. The bracket provided is bolted to the grinding machine and supports the hanger mechanism. The gage itself can be changed from one machine to another by inserting it in the different hangers. Although the gage is usually hung in front of the grinding wheel, it can be mounted at the side or on the table.

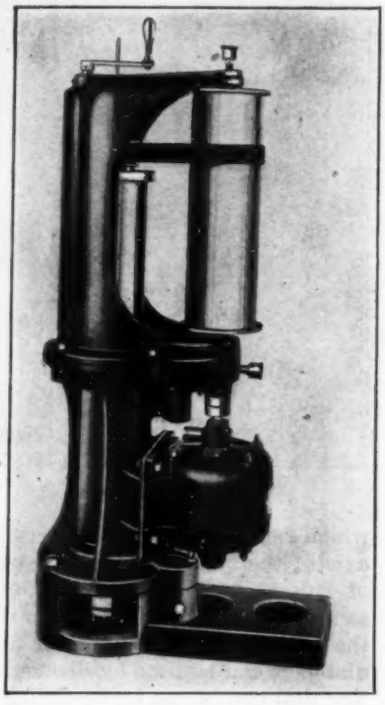
The gage is suitable for determining the size of all cylindrical ground work, as well as of taper work. Work with splines or holes can be calipered in the same manner as done with a snap gage. The operation is more quickly performed, because the gage is always held in position for the measurement.



PRATT GRINDING GAGE

"Simplicity" Cylinder Reboring and Grinding Machine

A portable machine for both reboring and grinding automotive cylinders has recently been brought out by the Simplicity Engine and Manufacturing Co., Fort Washington, Wis. The machine can be used on either open or closed cylinders up to 11½ in. in depth. Many types of cylinder blocks can be ground in the chassis without the necessity of removing them.



"SIMPLICITY" REBORING AND GRINDING MACHINE

The accompanying illustration shows the arrangement of the parts. The machine is driven by a 1½-hp. motor and is ordinarily supplied for either 110- or 220-volt alternating or direct current. The boring bar is driven by means of gears at a normal speed of 40 r.p.m. It is 2¾ in. in diameter and has a bearing surface in the housing 10½ in. long. The grinding spindle is mounted inside the boring bar and runs on ball bearings at a speed of 5,000 r.p.m. It is driven by means of a belt from the long vertical pulley at the top of the machine.

The downward feed is automatic, and the boring bar can be elevated by means of the crank at the top of the frame. An adjustable automatic stop prevents the bar from going too low in the cylinder.

The base block is provided with holes so that it can be clamped to the cylinder block to be bored. The machine itself is pivoted on this base, so that it can be merely swung to the side when it is desired to center the cylinder bore or to change heads. Before clamping, the device is centered over the cylinder by dropping a conical plug into the top of the bore.

A boring head having three cutters adjustable simultaneously by means of a central tapered plug, is furnished. It can be easily secured to or removed from the end of the boring bar. The head has a range from 2¾ to 3⅞ in. Larger heads can be furnished for bores up to 5⅛ in. Rings for use in setting the cutter head to size are furnished. Rings in oversizes of 0.010 and 0.020 in. for seven sizes of cylinders are supplied.

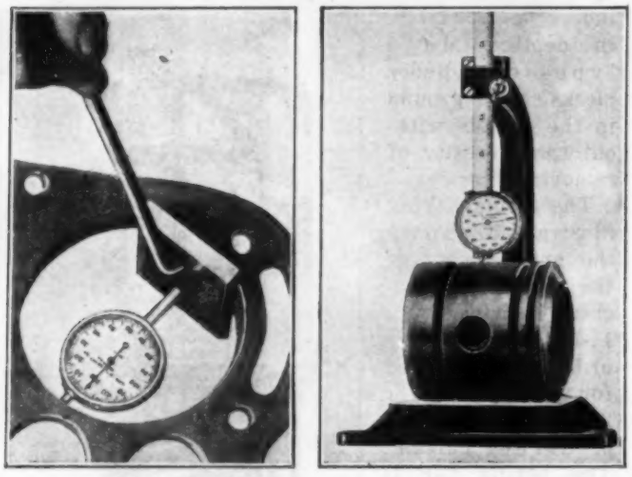
After the boring head has been passed through the cylinder, the device is merely swung on its base, so that the grinding head can be put in position. The shaft of this head is mounted on phosphor-bronze bearings. The head itself has an eccentric mechanism that can be adjusted up to ½-in. throw by means of a screw. The head is self-contained and is dust and dirt proof.

The device has a length of 17 in., a width of 8 in. and a height of 35 in. Since it weighs only 140 lb., it is easily portable and can be handled by one man.

Atlas "Mikro-Indicator" Cylinder and Piston Gages

The gages illustrated herewith have recently been placed on the market by the George H. Wilkins Co., 180 N. Market St., Chicago, Ill.

The cylinder gage, shown at the left, consists of a dial gage with two contact points and a saddle with a supporting stud on which the indicator is mounted and



ATLAS CYLINDER AND PISTON GAGES

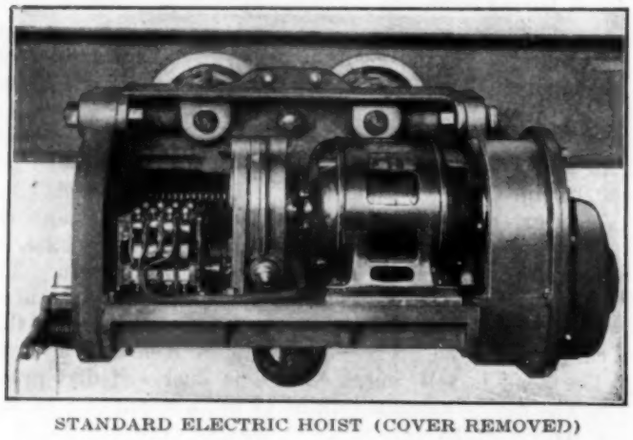
which holds the contact points at a right-angle to the axis of the cylinder. The gage can be used in cylinders of from 2¾ to 5 in. in diameter and indicates in thousandths of inches. In addition to testing cylinder bores, the indicator can be used for any purpose for which a dial gage can be used by dismounting it from the saddle. The dial can be set by revolving the bezel.

The piston gage, shown at the left, is a bench gage with a range of from 0 to 6 in. The dial indicator is mounted on a sliding scale graduated in inches and sixteenths. By use of this gage pistons and piston pins can be checked for diameter, roundness, and uniformity. Flat pieces can also be checked for thickness. The dial indicates by thousandths of an inch and can be set in the same manner as the dial on the cylinder gage.

"Standard" Electric Hoist

The electric hoist illustrated herewith has recently been brought out by the Standard Electric Crane and Hoist Co., 1420 Chestnut St., Philadelphia, Pa.

The hoist is rugged in design and the working parts are fully inclosed in a dust- and weather-proof case.



STANDARD ELECTRIC HOIST (COVER REMOVED)

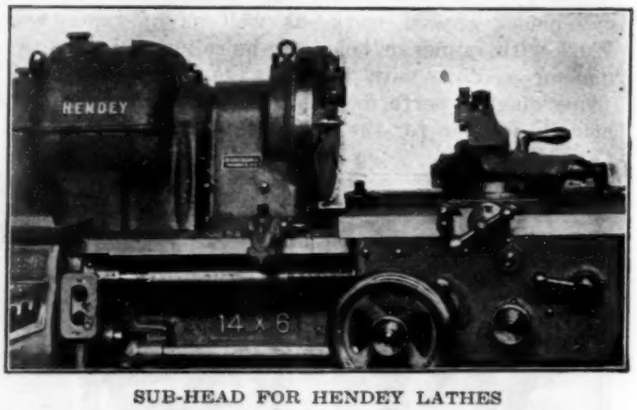
The drive is through spur gears which are cut from forged steel blanks and then heat-treated. All gears operate in an oil bath and automatically splash lubricate the main bearings. All bearings except the main are lubricated by the Alemite high pressure system. The hoist is equipped throughout with Hyatt high-duty bearings. The pins for the track wheels are made of manganese axle steel.

The hoisting motor is specially built for service and is guaranteed against overheating for a half hour's continuous run. The lowering brake is of the screw and disk type and runs in an oil bath. The holding brake is lined with asbestos brake-band lining. It is cam operated and will hold the load at any point. When the load block reaches its upper limit of travel an automatic device breaks the electric circuit and applies the holding brake. Either a two- or four-part rope block is supplied with each hoist. One of the main features of the hoist is the low headroom required. The hoist is made in two types, one type being moved along the rail by hand and the other type by motor. In both cases control is from the floor.

Each type is made in five sizes ranging from 2,000 to 10,000 lb. hoisting capacity. Heights of lift are from 15 to 50 ft. and hoisting speeds are from 10 to 70 ft. per minute. Weights are from 1,300 to 2,050 lb. Motors for either alternating or direct current can be furnished. The hoists are designed to travel on an I-beam of 10 in. minimum size and to go around a curve having a minimum radius of 8 feet.

Sub-Head for Hendey Lathes

The Hendey Machine Co., Torrington, Conn., has brought out an attachment for its standard lathes and which is known as a "sub-head" and is for the purpose of assisting in the cutting of worms, threads, hobs, etc.,



SUB-HEAD FOR HENDEY LATHES

of unusually rapid lead, and also in connection with the backing-off or relieving of cutters having a large number of teeth. The attachment is fitted to the inner Vs of the lathe and is set in place and clamped by means of a clamping bolt as easily as is the tailstock, no other bolts or screws being needed.

A small ring gear screws upon the spindle nose of the lathe so that when the attachment is moved into place against the headstock, it meshes with the first member of a quill gear the second member of which meshes with an annular gear upon the back of the faceplate, giving a six to one reduction in speed relative to the lathe spindle. The faceplate turns upon a hollow hub and therefore provides for the use of a dead center

at this end of the lathe, which center is in alignment with the regular tail center.

By the use of this attachment a helix having a lead of one turn in 6 in. may be cut with the same screw gears that would be used to produce a one to one lead, thereby relieving the gear train and leadscrew of much of the strain that would be imposed in the cutting of rapid leads. In relieving hobs or cutters having a large number of teeth the same advantage is gained. To relieve a 36-tooth cutter the relieving attachment would be geared the same as it would be for a 6-tooth cutter if the operation was to be performed without the subhead.

The attachment is made for all Hendey lathes from 12 to 24 in., inclusive.

"Simplex" Ring Gage for Setting Reamers

The Ampco Twist Drill and Tool Co., 18th and Howard Sts., Detroit, Mich., has recently brought out a line of ring gages for use in setting expansion reamers of the Critchley type. These gages, designated as the "Simplex" gages, enable accurate setting of the size of a reamer without the use of a micrometer. A saving in time is thus possible. The desired size of gage is merely slipped over the reamer and the blades expanded, so that they fit the gage closely. The size is thus obtained without need of any other direct measurement. The shank of the reamer is held in a vise while the adjustment is being made. The gages are made of tool steel, tempered and then ground to size. They can be furnished in all standard sizes, and in the over- or under-sizes required.

"SIMPLEX" RING GAGE FOR SETTING REAMERS

The gages can be supplied singly or in sets, packed in wooden boxes. Sets consisting of Ampco adjustable Critchley reamers and Simplex gages can be supplied, for automotive purposes, especially. Thus, all of the reamers and bushings necessary for work on engine or transmission bearings are packed in one box, so that all parts are conveniently available.

Elwell-Parker Electric Industrial Crane Truck

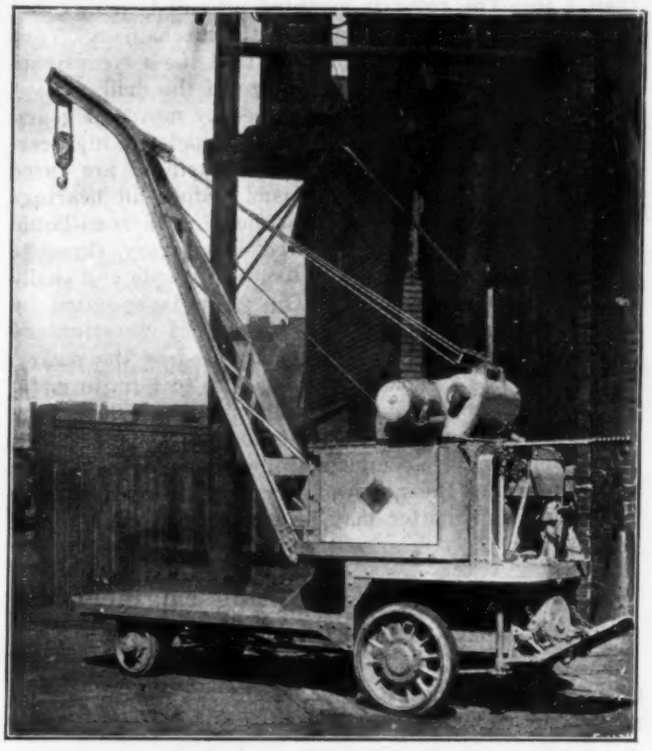
The crane truck shown in the accompanying illustration is the product of the Elwell-Parker Electric Co., Cleveland, Ohio, and has just been placed on the market.

The crane is mounted on an industrial load-carrying truck and is adapted for use inside of buildings as well as out of doors.

The lifting capacity is 3,000 lb. at 6-ft. radius and 1,000 lb. at 12-ft. radius without outriggers. The stacking capacity is 12 ft. high with boom set to lift 3,000 lb. at 6-ft. radius.

The single motor, double-drum hoist handles separate lines to the boom and hook. The motor hoist-unit and battery in their compartment, form a counterbalance for the maximum load with the boom at 12-ft. radius.

The crane column is supported on a heavy, broad pillar and revolves on large ball and roller bearings. A



ELWELL-PARKER INDUSTRIAL CRANE TRUCK

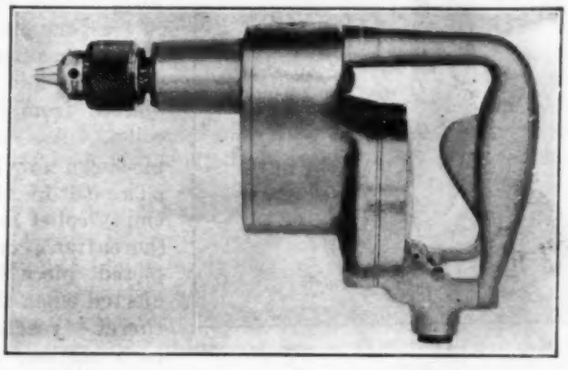
geared slewing device swings the crane through 180 deg. The boom can be raised or lowered or swung to right or left and locked in any desired position. With the boom lowered, the crane will pass through an opening 6 ft. in height.

Current for all motions is furnished from a single battery and to avoid swinging or twisting the cables they are brought up through the crane column. Only two motors are used and both controllers are in front of the operator.

The safety features incorporated in the outfit include: Crane trip-switch, truck automatic-control, worm drive, four wheel steer, and pressure lubrication.

Turbine Air Tool Co. "Tiny" Portable Drill

An air-driven portable drill, designated as the "Tiny" drill because of its small size, has recently been developed by the Turbine Air Tool Co., 710 Huron Road,



TURBINE NO. 2-A "TINY" PORTABLE DRILL

Cleveland, Ohio. The drill, the No. 2-A model of which is shown in the accompanying illustration, is driven by a small turbine. The rotor of the turbine is a solid piece of an aluminum manganese alloy and weighs less than ½ lb. The rotor is mounted on ball bearings, but does not touch any other part of the mechanism. Thus there is no wear on the rotor, so that the air consumption does not increase with the age of the drill.

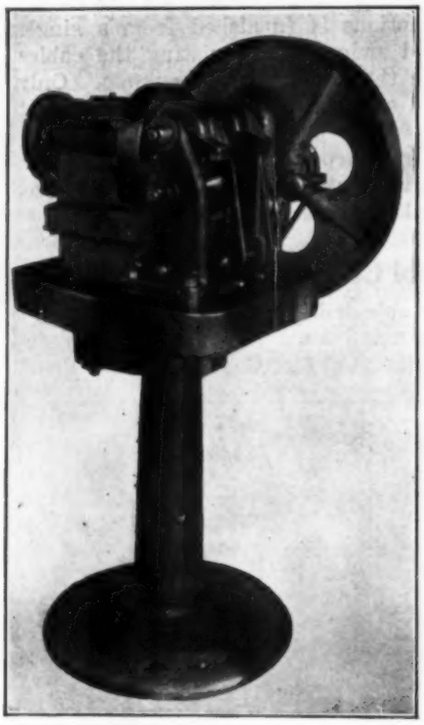
The reduction in speed is obtained by means of gears, both the gears and the shaft being made of high-carbon chrome-nickel steel. Ball bearings are used throughout the entire mechanism. Since all bearings and gears are contained in one housing, a semi-liquid lubricant that need be renewed only every three to six months is employed. The tool has a wide and easily controlled range of speed. The valve is operated by the trigger in the handle. The absence of vibration and the smoothness of operation are stressed by the maker.

The drill has a capacity for holes up to ⅜ in. in metal and ½ in. in wood. Its maximum speed is 2,000 r.p.m. Due largely to the fact that the housing is made of an aluminum alloy, the complete tool weighs only 5 lb. The part containing the nozzles is easily accessible, so that dirt or foreign matter may be easily removed.

Manufacturers' Consulting Engineers Nut Castellating and Hexing Machine

The castellating and hexing machine shown in the accompanying illustration has lately been placed on the market by the Manufacturers' Consulting Engineers, McCarthy Building, Syracuse, N. Y. The machine, as its name implies, is intended for the castellation of nuts and for milling the hex on spark plugs or for similar operations on other articles.

The work is contained in six collets carried by a revolving turret, the work in every alternate collet being operated on simultaneously. The turret is automatically oscillated to and from the cutters and is indexed 90 deg. on the back stroke.



NUT CASTELLATING AND HEXING MACHINE

After the turret has completed the first revolution and reached the position farthest away from the cutters, one piece of work has been completed and is ejected from its collet. Another piece can now be placed in the empty collet and thereafter a completed piece is ejected when the turret reaches each station, or six pieces at each complete revolution. As each piece is ejected another one is loaded, making the operation practically continuous.

Three cutters are spaced 120 deg. apart and take their cuts simultaneously.

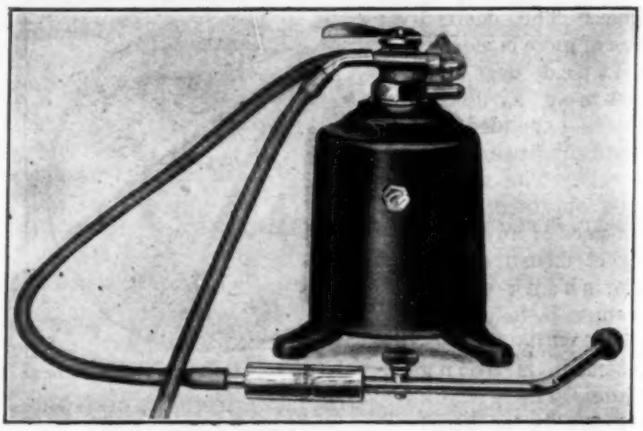
Cutting compound is pumped through the turret spindle and distributed to the work through the collets in such a manner that only the collet in cutting position is receiving the compound. This method of distributing the compound keeps the collets clean as it forces out all chips and dirt. The machine is belt driven and is equipped with a clutch for stopping and starting.

The capacity of the machine is stated to be 1,000 nuts or 500 to 600 spark plugs per hour.

Ransom & Randolph Gasoline Blowpipe Outfit

The gasoline blowpipe outfit illustrated herewith has lately been brought out by Ransom & Randolph, Toledo, Ohio, and is intended for use in soldering by jewelers, electricians, battery-men and automotive mechanics.

The blowpipe is designed to use as fuel, the present-day gasoline by preheating the air. The operator is



GASOLINE BLOWPIPE OUTFIT

given a choice of gas-air ratio to suit either the required flame or the quality of fuel used, by simply directing the air through different ports by the control lever. The control lever is movable through an arc of 90 deg. and at one extreme the gas delivered is rich in fuel value, while at the other extreme it is very lean. All positions of the lever between the extremes result in gradual changes.

At the rich extreme, all the warmed air used is directed below the gasoline level and in passing attracts the very light hydrocarbons and also warms the heavier ones, lowering their specific gravity to a point where they can be carried away by the air when the light hydrocarbons are exhausted. At the lean extreme, all air is directed to the blowpipe and takes up fuel by evaporation from the exposed surface of the gasoline. At this extreme some cold air is passed into the blowpipe tube over the port leading to the fuel chamber and tends to chill and drop the excess of light fuel.

The flame at the blowpipe tip covers a wide variation from a jet of about ⅛ in. in diameter and 1 in. long to an enveloping flame of 1 in. in diameter and 6 in. long.

It is claimed that this blowpipe will burn from 70 to 82 per cent of the volume of fuel.

Norton Model 81-B Crankpin Grinding Machine

The Norton Co., Worcester, Mass., has just placed on the market the Model 81, Type B crankpin grinding machine shown in Fig. 1. The machine is intended for working at high speed with great accuracy on the pins of crankshafts. The wheel spindle has flood lubri-

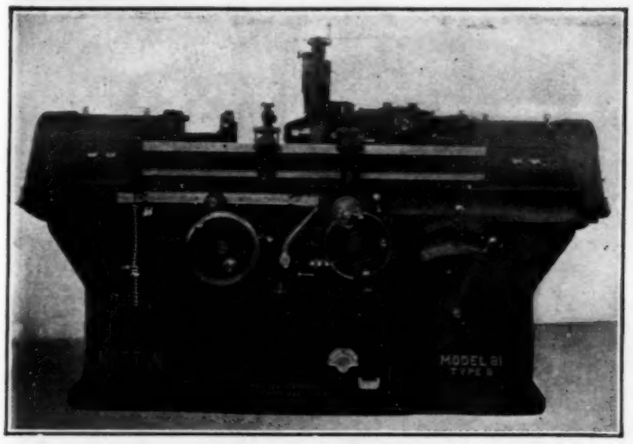


FIG. 1—NORTON MODEL 81-B CRANKPIN GRINDING MACHINE

cation and adjustment by means of thumbscrews. The end thrust bearings are also provided with automatic oiling facilities and adjustment by means of thumbscrews.

The machine has a two-speed hand-operated table traverse, the slow speed being used for truing and the fast speed for moving the table from one pin to another. Six speeds of the work table are provided, the changes being made by heat-treated sliding gears running in an oil bath.

The machine is equipped with automatic power infeed for the wheel, which feed is independent of the work speed. The rate of the infeed is arranged to suit the

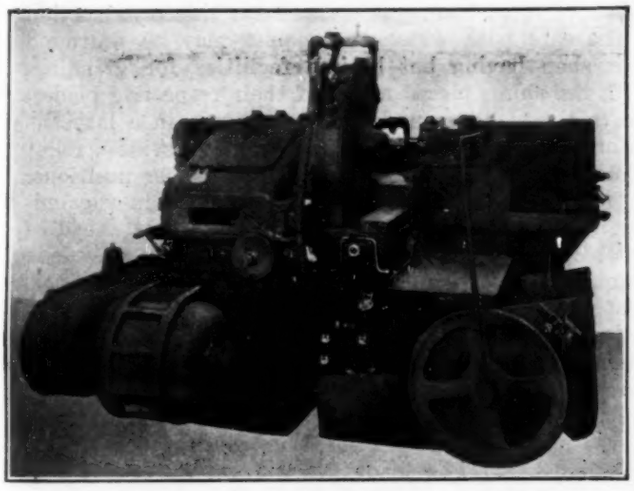


FIG. 2—REAR VIEW OF MODEL 81-B MACHINE

work for which the machine is intended. A safety device is provided in the wheel-feed mechanism to prevent injury to the wheel or crank by bringing the wheel into contact with the work too suddenly when starting to grind the pin.

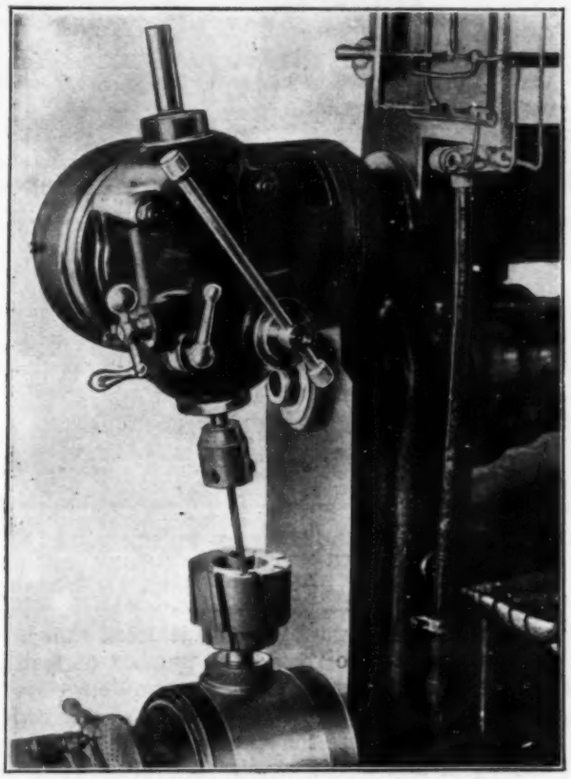
The rear base unit, which can be seen in Fig. 2, is the same as that employed on the 10-in. Type B grinding machine described on page 604 f, Vol. 53, of *American Machinist*. The arrangement of the motor and of the movable water tank should be noted.

The machine is made in four sizes, the swing of each being 14 in., and the work length varying from 24 to 48 in. The weights of the machines vary from 11,375 to 11,600 lb. with the motor. The floor space occupied by the largest size machine is 7 ft. 3 in x 10 feet.

Rockford Universal Milling and Drilling Attachment

The Rockford Milling Machine Co., Rockford, Ill., has lately brought out, for use on milling machines of its make, the universal milling and drilling attachment shown in the accompanying illustration.

The attachment is mounted on the face of the column above the spindle and receives its drive by a geared



ROCKFORD UNIVERSAL MILLING AND DRILLING ATTACHMENT

connection from the back end of the spindle through a driving sleeve substituted for the overarm. From the driving sleeve, motion is delivered to the attachment through bevel gears. The method of locating and driving the attachment does not interfere with the free use of the main spindle.

The attachment has two graduated circular bases placed at right-angles to each other and both bases can be swiveled through 360 deg., hence there is no conceivable angle to which the spindle cannot be set.

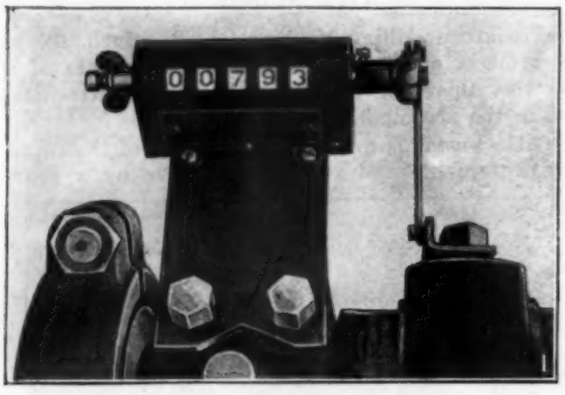
The spindle of the attachment is mounted in a graduated quill and can be fed in or out either directly by rack and pinion or by driving the pinion by worm gearing, giving the choice of two feeds, one of which is 48 times faster than the other.

Sixteen spindle speeds are obtainable, ranging from 21 to 414 r.p.m. The hole in the spindle is No. 9 B. & S. taper.

Precision "Universal Model" Counter with Measuring Attachment

A counter which can be used on practically any machine where record of the number of moves made by any part of the machine, or of the number of pieces or loads which pass a given point is desired, has been placed on the market by the Precision Machine Co., 415 Chestnut St., Milwaukee, Wis.

The counter, which is shown in Fig. 1 attached to a punch press, can be used either as a revolution or



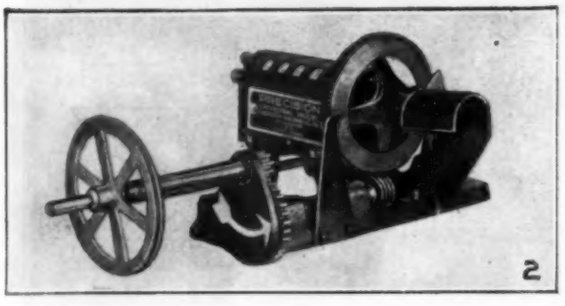


FIG. 1—PRECISION COUNTER ON PUNCH PRESS
FIG. 2—COUNTER WITH ATTACHMENT FOR RECORDING LENGTH

stroke counter. By means of the attachment shown in Fig. 2, it can be used to record the number of feet of thread, twine, or wire that is being wound on a spool. The thread passes around the aluminum wheel, which acts as a pulley to operate the spur gears, which in turn drive the worm and worm wheel. The brass plate attached to the side of the worm wheel is graduated in feet, so that one complete revolution of the wheel records the passing of 100 ft. of material. The counter thus records hundreds of feet only.

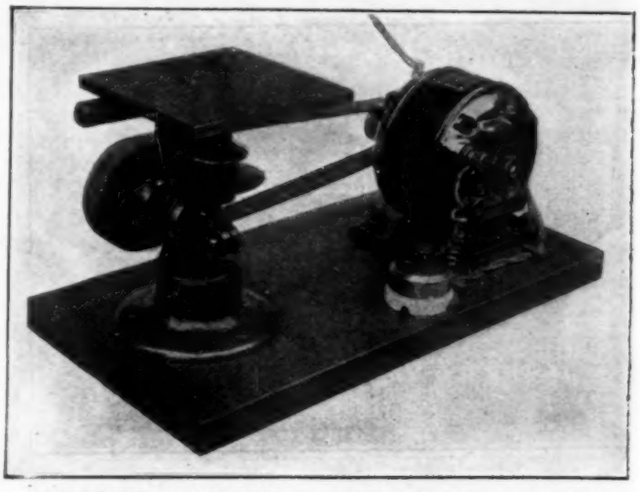
The counter is suitable for use on stamping machines, printing presses and conveyors, where its principal function is as a revolution or stroke indicator. As it has an unlimited amount of over-stroke, no particular care is necessary in setting the connection rod. All wheels are locked when not counting, so that they can operate only when the machine is operated.

No lead gear, lock washers, ratchets nor springs are used. All gears are made of steel and the important parts are hardened. A transparent, fireproof material is used to cover the numbers. The counter can be furnished with electrical contacts, if desired, which make it possible to locate it any desired distance from the machines, the operations of which it is desired to count.

"Hartford" Motor-Driven Bench Filing Machine

The Hartford bench filing machine made by the Robinson Tool Works, Waterbury, Conn., and illustrated herewith, has had some improvements added to it.

The top plate or table now has a double swing so that



IMPROVED "HARTFORD" BENCH FILING MACHINE

it can be tilted to angles up to 10 deg. in any direction. An improved dust guard has also been added.

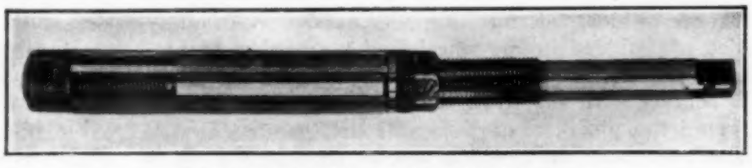
"Reamrite" Piston-Type Expansion Reamer

The Cronin-Waddell Co., 104 Portland St., Boston, Mass., has placed on the market an expansion reamer, shown in the accompanying illustration, that is intended especially for reaming the pin holes in automotive pistons. Though constructed upon the principle usual in such tools, the slots in which the blades are set are milled slightly wider than necessary to accommodate the thickness of the blades, and the extra space is filled by a liner, or shim, placed back of each blade.

One of the advantages claimed for this construction is the ease with which the reamer may be reground in a shop having but limited facilities for grinding. With the shims placed ahead of their respective blades, the tool may be ground between centers in a lathe as an ordinary concentric piece of work. Eccentric relief is obtained by reversing the shims to former positions.

The "pilot blade" feature is maintained in regrinding by first grinding the tool with the shims ahead of the blades, leaving a suitable length at the pilot end untouched. Reversing the position of the shims, this pilot portion is then ground to the required size. This leaves the tool with a concentric pilot and cutting blades having an eccentric relief, without the necessity for a relieving or backing-off attachment.

The reamer is made in seventeen sizes, the range of the smallest being $\frac{31}{64}$ to $\frac{33}{64}$ in., and of the largest $3\frac{7}{16}$ to $3\frac{3}{4}$ in. The blades vary from $1\frac{3}{4}$ to 6 in. in length and the reamers from $5\frac{1}{2}$ to 20 in. long overall.



"REAMRITE" EXPANSION REAMER

News Section

Research Council Plans Wide Activity

To arouse national interest in industrial research, Alfred D. Flinn, secretary of the Engineering Foundation and chairman of the division of engineering of the National Research Council, is on a tour of several weeks to the Pacific coast.

Mr. Flinn goes as the emissary of organized research to enlist the aid of engineers of the far West in a nation-wide plan of industrial research in which the Foundation, the Council, Government department and the industries will link their efforts. United action of this kind, according to leading engineers, is necessary if the United States is to retain its industrial supremacy and profit by the lessons of the war. Engineers pointed out that German efficiency both in war and peace was due largely to organized research.

A big research highway program and the movement to drive the shipworm from American ports, in which it has caused billions of damage, are among the projects to be explained by Mr. Flinn, whose itinerary, beginning at Salt Lake City June 26, will include Los Angeles, San Francisco, Sacramento, Riverside and Davis, Cal.; Portland, Ore.; Seattle and Bellingham, Wash.; Vancouver, B. C.; Prince Rupert, Jasper Park, Alta.; Winnipeg, Duluth, Minneapolis and Chicago.

Mr. Flinn, in addition to explaining the purposes of the Engineering Foundation and the National Research Council to the engineers of the West will deal with the place of the engineer in national and international affairs, more especially those questions now before Central Europe.

Marconi Awarded John Fritz Medal for Wireless Telegraphy

The John Fritz gold medal, one of the highest distinctions bestowed by the engineering profession in America and presented annually for signal achievement in applied science as a memorial to John Fritz, has been awarded for 1922 to Senator Guglielmo Marconi. The communication to Senator Marconi from Prof. Comfort A. Adams of Harvard, chairman and Charles F. Rand of New York, secretary of the John Fritz medal board says, "The medal is awarded to you for the invention of wireless telegraphy."

Formal presentation will be made to Senator Marconi in the Engineering Societies' Building in New York City, Thursday, July 6, at 8:30 p. m. The gathering will be largely in the nature of an international celebration, marking not only progress in scientific knowledge but the establishment of close relationship between the American and Italian engineering profession as well as other European countries.

With this issue we begin the publication of a new page in American Machinist. It will be our aim to present in tabloid form the various economic facts and statistics of value to men in the machinery manufacturing field. Four charts will be published each week, one showing general business conditions as indicated by an accepted economic barometer, such as revenue freight car loadings, one showing the trend of some element entering into the cost of building machinery, one showing the trend of a machinery market, and one showing the opinion of the investing public as indicated by stock quotation averages.

Short paragraphs on timely business subjects and tables of significant figures will fill up the balance of the space. As the first few pages are in the nature of an experiment it is sincerely hoped that readers of the paper will tell us where we are publishing useless material and what we are omitting that should be included.

A. L. DeLeeuw Joins Staff of "American Machinist"

The *American Machinist* takes pleasure in announcing that, beginning July 1, 1922, the services of A. L. DeLeeuw as consulting editor have been secured. Mr. DeLeeuw will devote half of his time to editorial work on the *American Machinist* and the remainder to his consulting practice.

Mr. DeLeeuw is well known to our readers through his articles on "Metal Cutting Tools" and "Methods of Machine Tool Design." His long experience as chief engineer of the Singer Manufacturing Co., the Cincinnati Milling Machine Co. and the Niles Tool Works, and as an independent consulting engineer will be turned to account in his editorial work.

Summer Industrial Course at Penn State

The seventh annual summer session in industrial organization and administration will be held at the Pennsylvania State College from August 28 to September 9 under the immediate direction of Professor Edward J. Kunze, assisted by Professors J. O. Keller and P. P. Henshall of the Department of Industrial Engineering.

The course is an intensive one, designed to meet the needs of manufacturers, superintendents, personnel directors, accountants, production managers and all others who pilot the affairs of industry.

Bulletins describing the course may be obtained by addressing Professor Edward J. Kunze, State College, Pa.

Machinery Exports Show Gain for May

Exports of metal working machinery for the month of May registered a slight increase as compared with the month of April. During May the total value of metal working machinery exported, amounted to $892,078 as compared with the April total of $786,951. Machine tools imported during the month were valued at $29,977 as compared with the total for May, 1921, of $7,711.

The detailed figures, taken from compilations just made by the Bureau of Foreign and Domestic Commerce are as follows:

EXPORTS METAL-WORKING MACHINERY

	April 1922	May 1922
Lathes	$45,608	$66,604
Boring and drilling machines	25,280	69,424
Planers, sharpers and slotters	25,685	17,590
Bending and power presses	644	15,806
Gear cutters	3,307	6,174
Milling machines	17,591	25,255
Sawing machines	1,329	2,930
Thread cutting and screw machines	15,229	17,668
Punching and shearing machines	8,700	12,610
Power hammers	5,723	13,188
Rolling machines	221	16,270
Wire-drawing machines	808	2,248
Polishing and burnishing machines	2,879	83
Sharpening and grinding machines	67,804	83,304
Chucks, centering, lathe, drill and other	10,105	26,028
Reamers, cutters, drills and other parts for machine tools	122,851	113,696
Pneumatic portable tools	17,919	18,930
Foundry and molding machinery	35,834	75,887
Other metal-working machinery and parts of	379,434	308,383
Total metal-working machinery	$786,951	$892,078
IMPORTS		
Machine tools	$7,711	$29,977

"Pittsburgh Plus" Case Before Federal Trade Body

Hearings before the federal trade commission in the "Pittsburgh Plus" case opened at Chattanooga last week before special examiner J. W. Bennett, and are expected to continue for three weeks during which time about thirty steel manufacturers and consumers of the southern territory will testify. Up to June 17, on which date an adjournment was taken, the commission had been in session in Chicago hearing the testimony of the western manufacturers for nearly three months.

The complainants in the Southern hearing are the Southern Association of Rolled Steel Consumers and the Birmingham Civic Association, while the United States Steel Corporation is the respondent. The Southern manufacturers are testifying that the basing of steel prices f.o.b. Pittsburgh is unfair and illegal when the steel is actually produced and shipped from Southern and Western points, and does not move from Pittsburgh. It is understood that witnesses at the Chattanooga hearing will include steel users from practically all of the larger industrial centers of the South.

The Business Barometer

This Week's Outlook in Commerce, Finance, Agriculture and Industry Based on Current Developments

BY THEODORE H. PRICE
Editor, *Commerce and Finance*, New York

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Looking back over the newspapers of this time a year ago we find that then as now the world had its troubles to contend with. The peace treaty with Germany had just been signed and was bitterly criticized. The tariff bill then in the House was vigorously assailed. Sir James Craig had refused to meet de Valera and peace in Ireland was despaired of. A railroad strike in this country threatened because the employees were unwilling to accept a 12 per cent reduction in wages ordered by the Labor Board.

There was an underproduction of coal and a winter famine was predicted. Unemployment was increasing. Middling cotton was quoted at 11¾ cents in New York and on June 20, 1921 the average price of 20 representative railroad stocks was lower than for 25 years.

But the railroad strike did not occur, the coal famine was averted, and the tariff bill has not yet been passed.

World Conditions Improving

There is now a scarcity of labor instead of unemployment. Cotton is quoted at 22 cents. Stocks are up from five to 100 points and the last six months have been reasonably prosperous throughout the country.

It is true that we are again threatened with a railroad strike and are in the midst of a coal strike. The Irish volcano is once more in a state of eruption and Mexican bandits are reported to have kidnapped some Americans. The financial condition of continental Europe is still troubled and the reparation question continues to be a bone of contention. But upon the whole the world is better off than it was a year ago and while something will always be out of gear reconstruction has progressed and is progressing.

An early settlement of the present coal strike has become probable because its menace is now generally appreciated, coal is arriving here from England and popular sympathy with the strikers has been destroyed by the brutal murders at Herrin, Ill.

Some of the irresponsible railway men may quit work but a general strike that will cripple the service is not likely. If it occurs it will be short lived and destroy the unions, for they are already in greater public disfavor than at any time previously in their history. In so far as these two major troubles are concerned the situation is more encouraging than it has been.

Most of the markets are in the summer doldrums. The only commodity that has moved much is rubber, which advanced nearly two cents a pound to 16¾ cents for the standard grade upon a reported agreement between the producers in the East Indies to restrict the output. Coming concurrently with an unprecedented demand for tires and automobile production in this country the effect upon the market has been marked and much higher prices are possible, for rubber has become one of the world's great staples.

Sugar is also firm, with every indication of a further advance for a small production in Java and Europe is inducing sharp competition for the Cuban supply. Wool, on the other hand, has been reactionary and one of the best informed men in the business writes me that he "thinks the top has been reached for the present as the proposed duty of 33 cents a pound on scoured wools will bring the cost of 'quarter bloods' up to 200 per cent above the foreign price and will inevitably reduce American Consumption." Cotton is somewhat lower on a reported improvement in the crop condition, which is to some extent offset by the widely proclaimed ravages of the boll weevil. It will be a weather market in cotton until the bales commence to move, for no one has any very definite conviction as to the size of the crop.

Silk is firm. So are lumber and building materials, including steel. Cattle are higher. The crude oil consumption for May was the largest on record. Copper is slowly moving upward. An active speculation and advancing prices for jute as a result of the short crop are reported from India. Wheat is about the only important staple that is not tending upward or well above the average of the last seven or eight years.

Trade reports are generally optimistic both as to the present and the future. The labor shortage is increasing. Speaking at Dayton, Ohio, last week R. H. Grant, of the Delco Lighting Co., prophesied that there will be a buyers panic this fall.

Money Market Easy

Railroad traffic continues remarkably good considering the coal strike. A shortage of cars in the autumn seems probable and the amount of building and new construction in progress all over the country is really amazing. All this is fundamentally due to the ease of money which promises to continue throughout the year unless a revival of speculation in stocks and commodities or a freight blockade or both absorb the loanable supply of bank credit.

The only change of importance shown by the weekly Federal Reserve statement is a reduction of 1.6 per cent in the reserve ratio, which now stands at 77.5. The slight reduction is due to increased rediscounting following the reduction in the rate. An abundance of bank credit is therefore indicated, but a great revival of speculation with a concurrent advance in prices would absorb the supply. The weekly bank statement should therefore be carefully watched. A sharp decline in the reserve ratio would be a danger signal.

The stock market, somewhat shocked by the sensational gyrations of Mexican Petroleum, has been quiet but conservative speculators are buying the railway stocks upon the expectation of better earnings and more consolidations. But in its application the principle of consolidation is not limited to railroads. Three banks in Los Angeles, having joint resources of over $200,000,000, have come together, the Consolidated Machine Tool Corporation, capitalized at $30,000,000, has been formed to acquire five machine tool companies in the East and Middle West, and the Simmons Hardware Co., of St. Louis, has acquired the Winchester Company.

Bonds have been quiet but with all the Liberty issues above par the investment demand has been sufficient to absorb all the first-class obligations offered. The $25,000,000 of 6½ per cent preferred stock offered by the New York Telephone Co. on the installment plan directly to its telephone subscribers was oversubscribed in a day.

Some indigestion is, however, reported among those who have partaken too freely of the second rate foreign bonds recently brought out. This is perhaps due to the assassination of Rathenau and the misgivings felt with regard to the future of the German Republic. The weakness in foreign exchange, especially francs and marks, may be ascribed to the same cause. On Thursday, when it was announced that the German Bank statement of June 23 showed that there were 156,553,669,000 paper marks in circulation the price fell to 26¾ cents per 100, the lowest figure thus far touched.

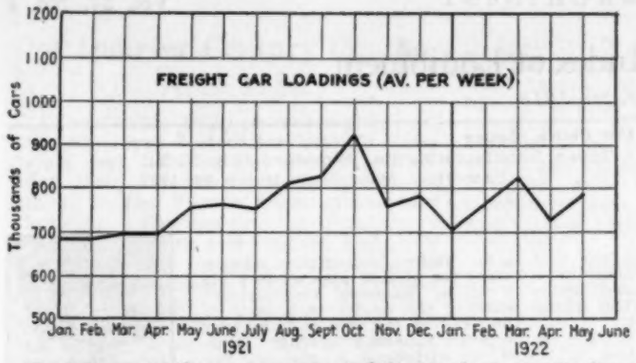
If the German Republic should fall the mark would in all probability be valueless, but those who hold that it is generally darkest before the dawn are disposed to believe that out of the very necessities of her own case France will consent to an abatement of her reparation demands that will make a German loan possible and so put continental Europe upon a more stable financial basis.

This cloud overseas is about the only shadowy spot on the horizon. If it disappears the outlook will indeed be bright.

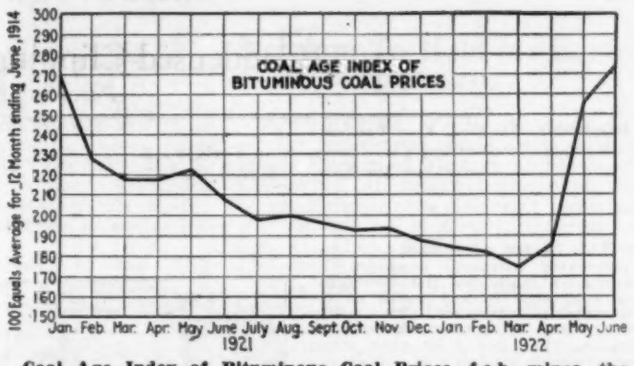
But if its brightness proves to be dazzling we may be wise to put on smoked glasses for vigilance in observation is more necessary when fair weather breeds over-confidence than when storms have made us careful.

British Aircraft Claims

The War Department plans to be represented, together with the Department of Justice, at meetings of the British commission in London, which will settle claims of Great Britain for use by the United States of British designs of aircraft engines and accessories during the World War.



Weekly car loadings of revenue freight based on reports from the railroads of the U. S. by the Car Service Division of the American Railways Association.



Coal Age Index of Bituminous Coal Prices, f.o.b. mines, the average of spot prices from July, 1913, to June, 1914, being taken as the base.

But for the immediate depressing effect of the coal strike and the threatened strike of railway workers, the general business situation would seem to hold promise for normally prosperous conditions during the second half of this year. The iron and steel industry is now operating at close to 75 per cent of normal capacity. In the textile industry there is shown an appreciable increase in the number of active spindles. Reports from many industries supplying material to the building and contracting trades indicate almost normal operation as compared with pre-war conditions. Unfortunately, the grain and cotton crop situation is not altogether clear at the moment, but hope is held out that during the next two months estimates will show conditions favorable, at least, to a normal yield.

Since the first of January, the total value of contracts awarded in the United States for the erection of water works, sewers, bridges, dredging, streets and roads, industrial works, buildings, Federal government work and miscellaneous construction, has reached the huge total of $779,766,747. The month of June alone shows contracts awarded and valued at $182,342,000. Contracts for the erection of industrial works of various kinds awarded during the month of June in the United States totalled $23,687,000, or an increase of approximately 57 per cent as compared with the month of May. The June figure brings the total value of contracts placed for the current year to July 1st up to $87,549,000.

Commercial failures in the United States for June show a continued decrease, according to Dun's Weekly Review. Reports show 364 failures as compared with 391 in the week previous and 303 in the corresponding week a year ago. Failures in which liabilities were $5,000 or more also show a decrease the percentage of the total being 55.5 as against 58.0 last year.

Comparative Prices of Shop Supplies

Average of New York, Chicago and Cleveland Prices

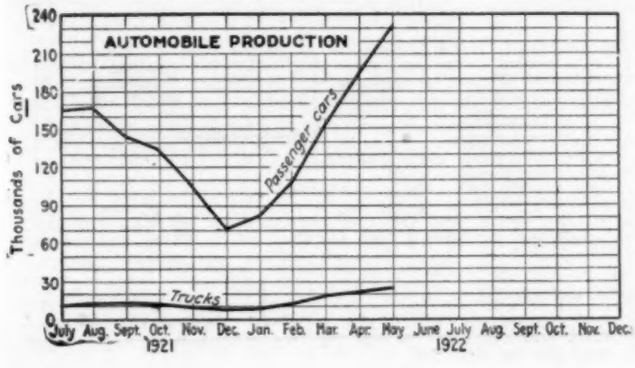
	Unit	June 1922	May 1922	June 1921
Soft steel bars	per lb.	$0.025	$0.023	$0.031
Cold finished shafting	per lb.	0.0325	0.032	0.045
Brass rods	per lb.	0.155	0.15	0.166
Solder (½ and ½)	per lb.	0.21	0.213	0.203
Cotton waste	per lb.	0.11	0.11	0.122
Washers, cast iron (½ in.)	per 100 lb.	3.83	4.00	4.06
Emery, disks, cloth, No. 1, 6 in. dia	per 100	3.11	3.11	.....
Lard cutting oil	per gal.	0.575	0.608	.....
Machine oil	per gal.	0.36	0.40	.....
Belting, leather, medium	off list	40–5% @50%	40–5% @50%	
Machine bolts up to 1 x 30 in.	off list	55% @60%	60%@ 60–10%	50%@ 60–10%

Labor rates reported from four cities show certain differences prevailing, but on the whole wages paid for skilled work indicate but slight decreases with imminent scarcity of efficient operatives. Tool makers in Philadelphia are being paid from 43 cents to 98 cents per hour depending upon the ability of the workman. In Detroit, the corresponding wage rate is from 75 to 80 cents while in and around New York City a rate of 85 cents prevails for high class men. Rates paid to bench hands vary from 37 to 65 cents in Philadelphia, 60 to 75 cents in New York City and 50 to 55 cents in Detroit. Lathe hands are being paid from 40 to 73½ cents in Philadelphia, 60 to 75 cents in New York City and from 70 to 75 cents in Detroit. Cleveland reports a rate of 78 cents for pattern makers.

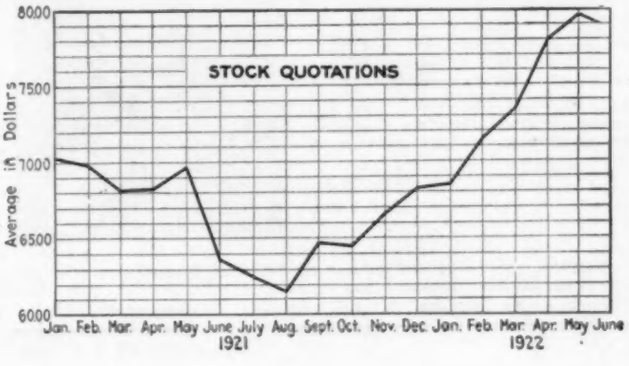
The situation abroad seems to be a little clearer than was the case a few months ago. Our foreign trade continues to improve and with an abandonment of political intrigue and squabble for a sane policy of reconstruction, there is every reason to expect substantial prosperity. For the past eight years the world's population has been but poorly fed, housed and clothed. On every hand and in all lands there is required goods of all classes and these wants cannot longer go unsatisfied.

The Foreign exchange situation improved during June. On June sixth sterling touched $4.515/8, this marking the highest point it has reached since July, 1919. The Scandanavian exchanges moved more or less sympathetically with sterling. In Argentina there has been some improvement during June, but in South America exchanges generally show there have been but moderate fluctuations. In continental Europe the financial situation is still in its greatly unsettled state and does not give any immediate indication of improvement.

Passenger cars and trucks, production based on figures compiled by the Bureau of Foreign and Domestic Commerce. Monthly average for 1919, 138,138 cars; 26,364 trucks.



New York Times Annalist combined average price of 25 railroad and 25 industrial stocks based on weekly averages of last sale in each week.



Condensed-Clipping Index of Equipment

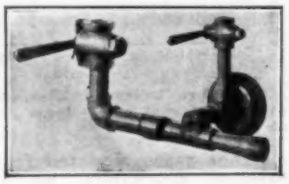
Patented Aug. 20, 1918

Inspirator, Air-Gas, Low-Pressure

Surface Combustion Co., Bronx, New York, N. Y.

"American Machinist," March 16, 1922

The device, a redesign of the inspirator formerly used on the furnaces made by the company, is adaptable to any make of industrial gas furnace. The entire operation is controlled by one valve. The gas cock used when starting or stopping is either entirely closed or entirely open. A change of air supply automatically changes the amount of gas used. Gas and air are mixed only at the point of supply to the burners, being thoroughly mixed just before entering the furnace.

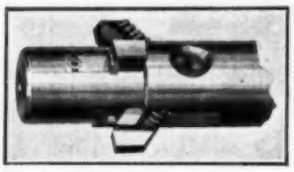


Boring Bar, Adjustable

Hannifin Manufacturing Co., Chicago, Ill.

"American Machinist," March 16, 1922

The bar is adaptable to rough-boring, finish-boring, and reaming. It can be furnished with removable block-type cutters, and a grinding fixture. The cutters can be set out or withdrawn by turning the graduated scroll. Either straight or angle-type cutters may be used, or a combination of both for boring different diameters, counter-boring or facing simultaneously. The cutters can be adjusted to cut on a common line. Combinations of cutters can be incorporated in the same bar.

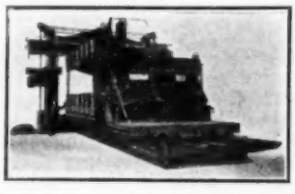


Planer, 15 x 10 x 38-Ft.

Betts Machine Co., Rochester, N. Y.

"American Machinist," March 23, 1922

The machine is driven by a 75-hp. reversing planer motor and has five toolheads, two on the crossrail, one extension-slide sidehead on each upright and one head on a separate column. The feed and power traverse of any head can be operated independently. The separate column carries a saddle equipped with vertical feed as well as power rapid traverse. The crossrail is raised or lowered by a 15-hp. motor and has automatic tool lifters on its heads. The table is equipped with a device for automatically increasing or decreasing speed during the cutting stroke.

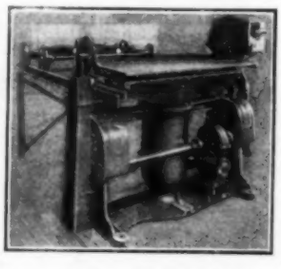


Molding Machine, Jolt, Direct-Draw, Roll-Over, Stationary

Osborn Manufacturing Co., Cleveland, Ohio

"American Machinist," March 23, 1922

The machine has the standard air-operated jolting mechanism, an electrically operated roll-over, pattern-drawing apparatus and run-out car, and the necessary piping, valves and wiring. The drawing of the pattern is accomplished when the roll-over table and the pattern are in perfect balance. Two molds may be handled side by side. The stroke of the air-operated jolting mechanism may be adjusted from 1 to 2½ in. The entire operation is automatic, but the motion may be stopped at any position, and the speed may be regulated. The motor driving the mechanism may be for either a.c. or d.c., and is equipped with an automatic electric brake.



Pin Puller, Cotter

Tuban Manufacturing Co., Richmond Hill, N. Y.

"American Machinist," March 16, 1922

The tool is for pulling cotter pins and is made in two sizes for pulling pins up to ½ in. and up to ¾ in. in diameter, respectively. The lifting point of the device is hooked in the hole at the head of the pin, and the two handles of the puller squeezed together. Each tool is tested to withstand a pull on the point of 400 pounds. The motion of the movable or lifting point is about 1 in. The lifting point is hardened tool steel. The end of one handle is shaped to a screw-driver point.

Gage, Connecting-Rod, "Twistest"

J. S. Imlach, 324 Catherine St., Ottawa, Canada

"American Machinist," March 16, 1922

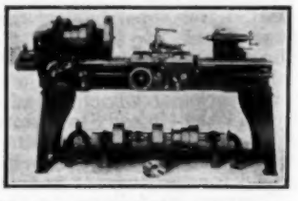
The device is used in aligning two bearings on the ends of rods, serves as a jig in scraping bearings, and is also used to test the alignment of the piston after assembling. It indicates at one setting the accuracy of alignment of the rod in both directions. The indicating part consisting of an arbor fixed in a four-armed casting, is attached to the wristpin end of the connecting rod. Capacity, rods from 6 to 12½ in. long between centers. Interchangeable mandrels up to 2¾ in. in diameter and indicating arbors up to 1¼ in. in diameter can be furnished.

Lathes, Engine, Quick-Change

Carroll & Jamieson Machine Tool Co., Batavia, Ohio

"American Machinist," March 23, 1922

The lathe, supplied in 13, 14, or 16-in. size, is for toolroom and automotive service use. Single or double back gears can be supplied. Right or left-hand threads from 3 to 64 per in. can be cut, the feed being changed by a handle and knob on the front of the machine. The apron has a feed reversing lever and an interlocking device. On the semi-quick-change lathe, three feed changes are provided by shifting a lever. The carriage can be clamped to the bed when facing work. Swing: over bed, 13¼, 15¼ and 16¼ in.; over carriage, 8, 10¾, and 11¾ in., respectively. Weight, 1,300, 1,700 and 2,100 lb., respectively.

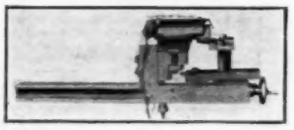


Grinder, Cutter, Crankpin Re-Turning Tool

Sawyer-Weber Tool Manufacturing Co., Los Angeles, Cal.

"American Machinist," March 23, 1922

The electric-driven cutter-grinding attachment enables rapid sharpening of the toolbit and can be easily applied without altering the re-turning tool. It is driven by a $\frac{1}{12}$-hp. motor running at 10,000 r.p.m. The cutter is passed in the groove of the guide blade, and micrometer adjustments are made by the handwheel and dial of the re-turning tool. The re-turning tool, when in operation, is fitted directly to one of the pins of the crank, and the tool handle rests on the lathe bed. The handwheel provides a feed for the tool, to adjust the size of the pin.



Clip, paste on 3 x 5-in. cards and file as desired

A Quarter Century for the A. S. T. M.

The twenty-fifth annual meeting of the American Society for Testing Materials was held at the Chalfonte-Haddan Hall, Atlantic City, N. J., June 26 to 30 in the Vernon room of the new building. The sessions, as usual, were full with papers and reports, and little time was lost in getting through the order of business. The first session was on Non-Ferrous Metals and Corrosion and included several reports such as that of Committee B-2 which presented new tentative specifications for brass pipe, copper tubing and condenser tubes and also for methods of chemical analysis of brass ingots and castings, and bronze bearing metals.

A paper on the remarkable casting qualities of some copper-silicon-aluminum alloys was presented by E. H. Dix, Jr., and A. J. Lyon. The corrosion problem received attention both in committee reports and at the hands of W. D. Bancroft, who believes that measurement of electromotive force is practically valueless in this connection and that the whole problem of retarded corrosion is essentially a question of film formation.

The second session was devoted to wrought, cast and malleable iron, beginning with a report of Committee A-2 recommending revision in existing tentative standards for wrought iron. The making of merchant bar iron by the Busheled scrap process was described in a paper by W. M. Myers. The "Nick-Bend" test for wrought iron was discussed by H. S. Rawdon and S. Epstein, who considered that the usual "nick and bend" clause in specifications is indefinite. Wm. R. Webster outlined a study of the physics of cast iron and suggested that the time has come to standardize existing practice as developed during the fifteen years operations under the society's specifications. Revised specifications for foundry pig iron and for chilled cast iron were suggested by Committee A-3 of which Richard Moldenke is chairman. This also included high test gray iron castings and semi-steel castings. The malleable castings committee, A-7, recommended a modification of the test specimen and an increase in the tensile requirements of the specifications.

The President's Address

The third session was opened with an address by C. D. Young, the retiring president, under the title of "A Quarter Century of Progress." In it he outlined the growth of the society and its work and spoke of the difficulties which lay in the path of the courageous group who formed it from among the American members of the ten existing International Association for Testing Materials. One of the main handicaps was the lack of appreciation of the benefits of standardization, of uniform methods of testing and a common nomenclature. A similar situation still confronts the advocates of standardization in other lines. Mr. Young touched with feeling on the necessity of an international association and urged that the American Society for Testing Materials strongly support any movement toward this end.

A session on steel included reports of Committees A-1 and A-4, the former presenting new specifications for carbon steel castings for railroads and the latter recommended practice for the heat treatment of such castings. The tensile properties of steel castings were treated of by Lawford H. Fry, having special regard for locomotive construction. A preliminary report on the Effect of Sulphur in Rivet Steel was made by G. K. Burgess while T. Spooner and I. Kinnard described laboratory tests on testing butt welded steel plates both electrically and magnetically.

Impact testing occupied the fifth session, being a sort of symposium in which H. L. Wittemore, D. J. McAdam, Jr., T. R. C. Wilson, Earl B. Smith, C. L. Warwick, T. D. Lynch, H. F. Moore, and F. C. Langenberg and N. Richardson participated. This was followed by a session on Fatigue of Metals, the first paper being by H. F. Moore, J. B. Kommers and T. M. Jasper. This paper was accompanied by an exhibit of tests which attracted much attention. The Measurement of the Shape of Brinell Ball Indentations was discussed by Fred E. Foss and R. C. Brumfield. The session included reports of Committees E-1 on Methods of Testing; C-5 on Fireproofing; D-15 on Thermometers and E-8 on Nomenclature. The remaining sessions dealt with such materials as coal, coke, road materials and others which have no direct bearing on machine work and are therefore omitted.

The new officers are: G. K. Burgess, president; W. H. Walker, vice-president, and the four new members of the executive committee are W. K. Hatt, J. R. Onderdonk, D. M. Buck and W. M. Corse.

Moffett Discusses Naval Aircraft Development

Admiral Moffett, Chief of the Bureau of Aeronautics of the Navy Department, appearing recently before the Senate committee on appropriations, discussed at length the great post-war work accomplished by the Navy in the development of naval aircraft and engines.

Speaking generally of aircraft development he said:

"The Navy has today a thoroughly developed and proved type of engine for every class of naval aircraft service, with complete detailed production plans and specifications for each type. The design of every type is an American development and is especially adapted to American quantity production and every type is in performance, weight, durability, dependability and general suitability at least equal to the best engine in the same class which has been developed in any other country in the world."

Automobile Exports Show Increase

Automobile exports for the month of May as compared with the corresponding month of 1921 indicate encouraging gains for this branch of American foreign trade. Figures just compiled by the Bureau of Foreign and Domestic Commerce are as follows:

EXPORTS OF AUTOMOBILES

	May, 1921		May, 1922	
	Number	Value	Number	Value
Automobiles, including chassis (Total)	2,941	$3,763,033	8,027	$5,763,539
Total motor trucks and busses, except electric	462	794,699	1,203	812,170
Total passenger cars, except electric	2,479	2,973,334	6,798	4,924,134
Station and warehouse motor trucks	11	9,386	42	29,970
Trailers	....	.....	34	6,149

Belgium To Hold Mechanical Exposition

According to W. H. Rastall, chief of the industrial machinery division of the Bureau of Foreign and Domestic Commerce, an international exposition of mechanical and electrical industries will be opened at Ghent, Belgium, on June 1, 1923, and will continue from June to October.

It is felt that this exposition should provide a splendid opportunity for American firms to exhibit machinery, equipment, etc., which they believe will be able to compete with the products of foreign manufacturers. The exposition will be held in the former buildings of the Ghent World's Exposition of 1913.

The various sections of the exposition and the classes of goods which will be exhibited, as announced by the Exposition Committee, are as follows: Metal working machinery of all classes, woodworking machinery, steam generators, boiler accessories, steam motors, mechanical devices of all kinds; telephone and telegraph equipment, electric lighting, chemical and metallurgical equipment and supplies of all classes.

Requests for information in regard to the exposition may be addressed to the "Comite de l'Exposition de 1923," Royal Casino, Parc, Ghent, Belgium.

Poland as a Machinery Market

That the iron and steel industry of Poland should develop considerably within the next few years is the opinion of H. B. Smith, acting commercial attaché, American legation, Warsaw. Present equipment is antiquated, and new equipment is needed to replace the machinery damaged or removed from the country during the war. While the industry is not as well organized or on as sound a basis as the textile industry, nevertheless there is an opportunity for the installation of American methods and machinery. This is particularly true if Polish ore deposits, upon which the Upper Silesian industry will soon have to depend for its ore supply, are to be opened up and developed.

Two obstacles stand in the way of American sales of finished goods and machinery in the Polish market: (1) The low value of the Polish mark makes it extremely difficult for Polish manufacturers and dealers to finance dollar purchases; (2) low production costs in Germany and proximity to the Polish market give German manufacturers a distinct advantage. However, any reconstruction and development of the Polish iron and steel industry on a large scale will require credit accommodations Germany is unable to extend at this time, and if American manufacturers, after a thorough investigation of conditions in Poland, are satisfied with the security offered, there is no reason why they cannot obtain the business, notwithstanding the present condition of Polish currency and German competition.

Condensed-Clipping Index of Equipment

Patented Aug. 20, 1918

Truck, Crane, Electric

Elwell-Parker Co., Cleveland, Ohio.

"American Machinist," March 23, 1922.

The crane truck is used for lifting and stacking material, and due to low bed and long boom is applicable to many jobs. Out-riggers with jacks to adjust the height are furnished at each side. The 12-ft. boom may be raised and lowered from the driving position. The crane will pick up 1,000 lb. at an 8-ft. radius, and with the out-riggers in position, will lift 3,000 lb. at a 6-ft. radius. The truck is equipped with a single storage battery for the motors operating the crane and propelling the truck.

Reamer, Adjustable, Helical, Inserted-Blade, "X-Cel, Shear-Cut"

Alvord Reamer and Tool Co., Millersburg, Pa.

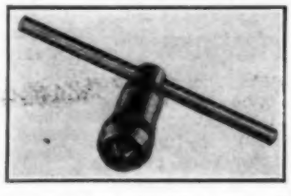
"American Machinist," March 23, 1922.

The body of the reamer is made of alloy steel, and the shank is heat-treated. The blades are made of a special steel. Both ends of each set of blades are ground, so as to make all blades the same length, and to give proper contact with the nuts. The reamer is recommended for work on bearing metals, particularly bronze, and may be used for split bearings and holes provided with oil grooves or keyways. The tool is made in seventeen sizes for diameters from 15/32 to 4 1/16 in.

Holder, Tool and Tap, No. 90

Consolidated Tool Works, Inc., 296 Broadway, New York, N. Y.

"American Machinist," March 23, 1922.



The chuck has a maximum capacity for taps up to ⅜ in. in diameter and other tools in proportion. The jaws have V-grooves extending parallel to the axis of the holder, and they are serrated throughout the whole length to give a secure grip. They are adjusted by turning a knurled sleeve. Length of handle, 7½ in. Length of tool, 4 inches.

Drawing Table, Tubular-Frame

Hoffman Drawing Stand Co., 189 N. Water St., Rochester, N.

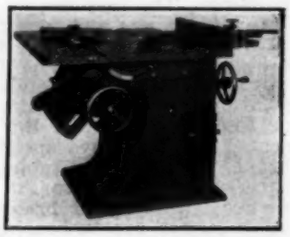
"American Machinist," March 23, 1922.

The board of the table can be tilted about a horizontal axis to almost a vertical position toward either the back or the front of the stand. Its height above the floor can be adjusted by turning the handwheel on the vertical screw in the center of the frame. The frame, although strong and rigid, is light in weight. A separate tray to carry the draftsman's instruments can be fastened to either side of the table and adjusted to a convenient height. Height, 44 inches.

Saw Bench, Tilting-Arbor, Type-J

Tannewitz Works, Grand Rapids, Mich.

"American Machinist," March 23, 1922.



The saw is driven directly by a motor mounted on a sliding bracket and supplied for either 2- or 3-phase, and for 220-, 440- or 550-volt current. The saw may be tilted by the handwheel at the right. Vertical adjustment of the motor is obtained by the hand wheel on the front of the machine. The machine has the necessary gages and a non-tilting rip fence. The saw is protected by a curved steel splitter guard. The starting box for controlling the motor is mounted on the side of the base. Table, 38 x 47 in.

Fixture, Angle, Universal, "Little Bob"

E. L. Krag & Co., 50 West Randolph St., Chicago, Ill.

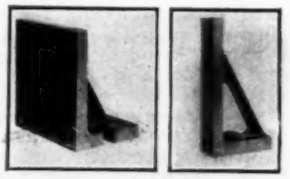
"American Machinist," March 23, 1922.

The device is used when making angle set-ups on milling, drilling and grinding machines. The plate can be tilted 90 deg. to either the front or the back. The yoke carrying the plate can be revolved. The base and a flange on the horizontal pivot are graduated. Holes are provided in the plate for special clamps. Plate, 3⅜ x 4¼ in. Base, 8½ x 6½ in. Height, 6¼ in. Weight, 25 pounds.

Angle Irons, Measuring, Precision

Simplex Tool Co., Woonsocket, R. I.

"American Machinist," March 23, 1922.

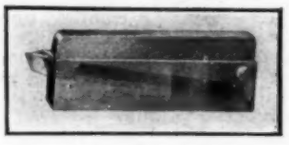


The angle iron shown at the left is used for holding work in place on a machine table. It has two slots, one for clamping one leg to the table, and the other for securing work to the angle iron. Two ribs brace the legs to keep the device from distorting. The iron is made in three sizes, 4 x 5 x 5 in., 6 x 6 x 8 in., and 8 x 10 x 12 inches. The precision measuring iron shown at the right is used when setting and aligning work, as for accurate boring operations. It has a bolt hole and a keyway, so that it can easily be secured to the table of the machine. The tool is made in two sizes, 2½ x 6 x 12 in. and 4 x 8 x 21 inches.

Toolholder, "Use-em-up"

Lovejoy Tool Works, 319-331 West Ohio St., Chicago, Ill.

"American Machinist," March 23, 1922.



This tool steel holder, designed to withstand heavy service, uses up short toolbits, and will hold full-length toolbits without danger of breaking them. Toolbits as short as 1½ in. can be rigidly held, and the holder can be used very near the work. The No. 2 holder carries a bit ⅝ in. square in section, and is ⅞ x 1½ x 4 in. in size.

Clip, paste on 3 x 5-in. cards and file as desired

Washington Notes

By Paul Wooton

The conferees on the naval appropriation bill for the fiscal year beginning July 1 have agreed to the appropriation of $100,000 as proposed by the Senate for an addition to the machine shops at the naval station at Pearl Harbor, Hawaii.

The collector at New York has been reversed in his ruling which made certain metal drilling machines being imported by D. C. Andrews & Co., of New York, dutiable at 20 per cent ad valorem. The general appraisers pointed out that the machines are to be operated by electric power; are constructed and designed to drill holes in metal and, consequently, must be regarded as machine tools which take an import duty of 15 per cent ad valorem.

The conferees on the Naval appropriation bill for the year beginning July 1 adopted $14,795,000 as proposed by the Senate instead of $12,100,000 proposed by the House, for the Navy Bureau of Engineering. It fixed a limitation of $1,675,000 as proposed by the House on expenses for classified employees thereunder instead of $2,048,000 proposed by the Senate. The conference committee eliminated the $100,000 appropriation for the experimental and research laboratory.

The National Screw Thread Commission will meet at the Bureau of Standards in Washington on July 7.

In considering the tariff bill, the Senate on motion of Senator McCumber, chairman of the Finance Committee, in charge of the measure, reconsidered the sections previously adopted relating to various kinds of machinery. Upon his motion, a duty of 60 per cent ad valorem was placed on reamers, drilling cutters, caps, guys, twist drills, and metal cutting tools of all descriptions, not especially provided for, containing more than 6-10ths of 1 per cent of tungsten or molybdenum. An amendment by Senator King, reducing the duty to 30 per cent, was rejected.

Obituary

Thomas Devlin, president, Thomas Devlin Manufacturing Co., the Hardware and Malleable Iron Works, and the National Specialty Co., and for a number of years president of the Philadelphia Foundrymen's Association, died at his home in Philadelphia on June 23 at the age of 84 years. Mr. Devlin was not the only one of America's early trail blazers in the iron foundry industry but his entire career from its humble beginning on his arrival in the United States at the age of 16, fills one with admiration for his achievements against great odds. He leaves behind some worthy monuments to his energy and genius and real assets to Philadelphia's industrial life.

W. H. Holland, president and general manager Sibley Machine Co., South Bend, Ind., died on June 14.

William E. Snyder, chief mechanical engineer and for the past 26 years connected with American Steel and Wire Co., died at his home in Pittsburgh on June 24 at the age of 54. Mr. Snyder at the time of his death was president of the Pittsburgh section of the American Society of Mechanical Engineers.

Business Items

The Super-Seal Piston Ring Corporation, Muskegon, Mich., manufacturer of piston rings for automobile motors, has arranged for a change of company name to the Oil-Stopper Piston Ring Corporation.

The Waterbury Standard Tool and Machine Co., Waterbury, Conn., has filed a preliminary notice of company dissolution. All claims will be handled by H. B. Jenkins, 53 Euclid Ave., Waterbury.

The Lehigh Valley Railroad Co., New York, N. Y., it is reported, will conduct a series of tests at its shops at Sayre, Pa., to ascertain whether or not the workers can handle repair jobs cheaper and more efficiently than under the outside contract plan system. The demonstration will cover heavy repairs to 15 locomotives, and comparative figures as to cost and quality of work will be tabulated from day to day. The results will then be subjected to comparison with figures for contract work of a similar nature.

The Cleveland Cold Drawn Steel Co., Buffalo, N. Y., has arranged for a change of company name to the Buffalo Cold Drawn Steel Co.

The J. W. Pohlman Foundry Co., 205 Baitz Ave., Buffalo, N. Y., manufacturer of stoves, iron castings, etc., has arranged for an increase in capital from $25,000 to $85,000, for general expansion.

The Guy Disc Valve Motor Corporation, Chelsea, Mich., recently organized with a capital of $1,500,000, has acquired a portion of the local plant of the Lewis Spring and Axle Co., for its proposed works, including a general metalworking building, foundry and powerhouse. Operations will soon be inaugurated for the manufacture of valves and other equipment for automobile service.

The Remington Cutlery Works, Inc., of Bridgeport, Conn., recently incorporated to manufacture and deal in cutlery, etc., has increased its capital stock from $25,000 to $1,500,000. The company will operate in a part of the war-time plants of the Remington Arms-Union Metallic Cartridge Co., Bridgeport.

The Ramapo Iron Works, Hillburn, N. Y., has recently bought two Liberty planers through McCabe & Sheeran Machinery Corporation.

McCabe & Sheeran Machinery Corporation, 50 Church St., New York City, has been appointed New York City agents for Liberty Machine Tool Co., Hamilton, Ohio.

The George W. Hoar Co., of Waltham, Mass., has recently been incorporated under the laws of Massachusetts, to deal in machinery, metal goods, etc. The company has a capital stock of $25,000, and the incorporators are George W. Hoar, Waltham, Mass.; John J. Sullivan and James E. Cussen, both of Boston.

James Fleming and Sons, St. John, N. B., founded a century ago in that city and for the past two years, operating a boiler machine shop and iron foundry on a reduced scale, plan to resume more active work. They will engage in the manufacture and repair of motor car parts in additions to the construction and repair of boilers and engines.

T. McAvity and Sons, St. John, N. B., have moved their shop personnel and equipment from the plant on Water Street to the Rothesay Avenue plant, formerly used in the manufacture of ammunition. While it is planned, eventually to transfer all manufacturing activities to the latter, the brass factory for the present will be continued on the old street site.

The Kohler Co., of Kohler, Wis., manufacturers of plumbing ware and fixtures, has established a southeastern office and distributing point to cover Georgia, Tennessee, Mississippi, Alabama and Florida territory, at 84 North Pryor street, Atlanta, Ga.

The Tennessee Coal, Iron and Railroad Co. is preparing to resume operations shortly at its No. 4 blast furnace in Bessemer, Ala., to make foundry iron for a time, to be followed later by a production of manganese iron. A 40,000 ton cargo of this ore is now en route to the district from Brazil.

The Tennessee Coal, Iron and Railroad Co., it is announced will blow in the No. 1 furnace at Ensley immediately upon completion of the work of rebuilding. It is also announced that the No. 1 furnace of the company at Bessemer, Ala., will resume operations early in July.

The Monongahela Iron and Steel Co., Paden City, W. Va. is arranging for the immediate resumption of operations at its local plant, following a shutdown for the past eighteen months. Employment will be given to 150 men.

The Fulton Co., Knoxville, Tenn., has announced a reorganization of the company with W. M. Fulton as president and treasurer; Warren Webster, vice-president; C. N. Mynderse, executive manager, and Henry Hudson, secretary.

The U. S. Electro Galvanizing Co., 32 Stockton St., Brooklyn, N. Y., announces a change in its corporate name to U. S. Galvanizing and Plating Equipment Corporation.

The Thomas Spacing Machine Co., Fulton Building, Pittsburgh, Pa., makes the announcement that the Chicago office of the company, formerly at 1243 Monadnock Block, has been removed to Room 936 in the same building.

The Mechanical Appliance Co., Milwaukee, Wis., manufacturer of Watson electric motors, has announced through Louis Allis, president, a chan in its corporate name to the Louis Allis Co., with the factory and main office at Milwaukee, as formerly.

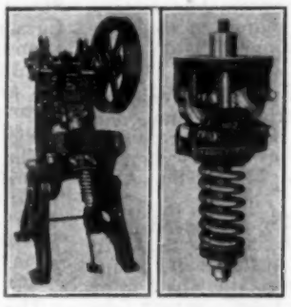
The George B. Miller and Sons' agricultural implement factory at Waterloo, Iowa, was destroyed by fire on June on June 21 with a loss, estimated by the owners, of $700,000.

The Hartford Auto Parts Co., Hartford, Conn., recently incorporated to manufacture automatic parts, etc., was organized during the past week by the election of the following officers: Charles A. Dana, South Plainfield, N. J., president; John S. Berry, of Plainfield, N. J., vice-president; Paul D. Hawkins, of Plainfield, N. J., secretary and treasurer. The board of directors consists of Charles A. Dana; Ezra P. Prentice, New York City; and Lenore Carbaugh, of Colonia, N. J.

Condensed-Clipping Index of Equipment

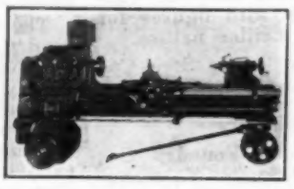
Patented Aug. 20, 1918

Cushion, Spring, Punch Press, "Even-Pressure"
Marquette Tool and Manufacturing Co., Chicago, Ill.
"American Machinist," March 23, 1922.



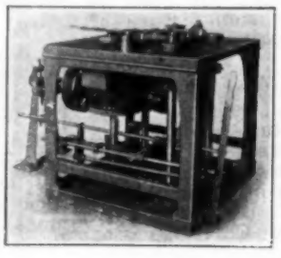
The attachment is adaptable to presses of small or medium size for drawing deep metal shells. It can be installed quickly without altering the dies or drilling holes in the press or bolster plate. It can be adjusted to different pressures, and retains its adjustment. The strain on the metal is reduced and back lash is prevented on the return stroke. The device is held in place by a bolt under the die or bolster plate. Four sizes for maximum depths of draw from 1¼ to 4 in., and for maximum pressures from 1,800 to 6,000 lb. are furnished.

Lathe, Portable, Geared-Head, Motor-Driven
Lehmann Machine Co., St. Louis, Mo.
"American Machinist," March 30, 1922.



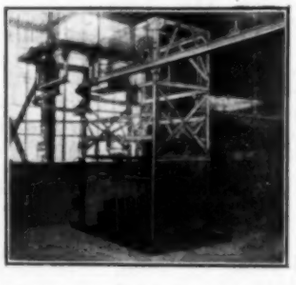
The lathe is adapted to use in railroad shops and in plants doing large work where it is desirable to bring the tool to the job. It is built in two sizes, having 18¼ and 20¼-in. swings, respectively. It is driven directly by an 1,800-r.p.m. motor mounted in the cabinet leg under the headstock. The headstock provides sixteen spindle speeds in almost geometrical progression with the use of only ten gears. Forward and reverse motions are obtained through friction clutches running in oil, and control handles for the reversing mechanism are located both at the apron and at the head end of the lathe.

Bending Machine, Tube
Davis-Bournonville Co., Jersey City, N. J.
"American Machinist," March 30, 1922.



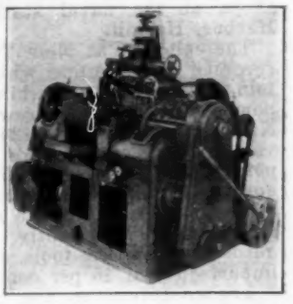
The machine is used for bending light tubing to special shapes, accomplishing the bending by two arms or cranks on the top of the table actuated by vertical oscillating shafts. Various arrangements of links and rollers can be applied to the arms to give the form necessary. The vertical shafts are driven by means of worm gearing and a crank motion underneath the table. The machine is driven by belt on a pulley that normally runs at 300 r.p.m. A clutch is provided for starting and stopping.

Elevator, Tramrail, Hand or Electric
Cleveland Crane and Engineering Co., Wickliffe, Ohio.
"American Machinist," March 30, 1922.



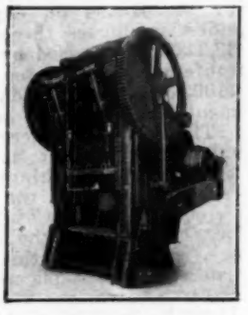
The elevator is used in dipping materials in tanks or vats where hand or electric Tramrail systems are employed. It forms a section of the Tramrail system itself, and is composed of a riveted structural steel framework. The size of the elevator depends on the size of the tanks or vats employed, while the height is regulated by the height of the tramrail. A one- or two-ton electric hoist furnishes the motive power for raising and lowering the platform, or air hoists can be used instead. The control is automatic. Fingers are dropped over the movable rail sections to hold the carrier wheels at the proper position on the elevator.

Grinding Machine, Cylindrical, Automatic
Warren F. Fraser Co., Westboro, Mass.
"American Machinist," March 30, 1922.



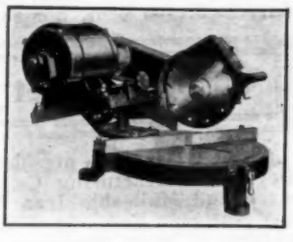
The machine is for grinding cylindrical parts with diameters larger than ¼ in. and held on centers, such as shafts, bolts, valve tappets, piston pins and similar work. The maximum length of the grind is 6 in., while work up to 10 in. in length may be held between the centers. The work may also be held in draw-in chucks. The machine is entirely self-contained and is run by a 15-hp. motor through a 4½-in. belt, or it can be driven by an overhead countershaft or a constant-speed pulley. All controls are easily accessible. Weight, 7,000 pounds.

Press, Toggle, Double-Crank
E. W. Bliss Co., Brooklyn, N. Y.
"American Machinist," March 30, 1922.



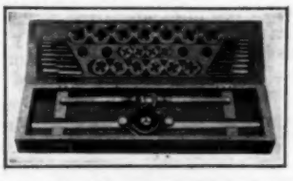
The press is used for drawing pressed-steel axle housings for automobile trucks and for making heavy stampings of all types. It is of the tie-rod construction, is twin driven and triple geared with a gearing ratio of 65 to 1. The outside slide or blank holder is operated through a series of toggles with which a dwell of 120 deg. is obtained. The adjustment of the inner slide is made by a 15-hp. motor, while the machine itself is driven by a 100-hp. motor. Stroke: inner slide, 28 in.; outer slide, 20 in. Maximum distance from bed: to inner slide, 59 in.; to outer slide, 56 in. Bed, 60 x 116 in. Face size: blank holder, 60 x 102 in.; plunger, 36 x 86 in. Weight, 600,000 lb.

Saw, Bench, Portable, Motor-Driven, Self-Contained
Tannewitz Works, Grand Rapids, Mich.
"American Machinist," March 30, 1922.



The machine is adapted to light work in cutting and fitting wooden parts. The base carries a one-piece table, upon which the motor and saw are mounted. The table and saw can be swung to any angle up to 45 deg. in either direction, while the motor and the saw are mounted on a frame that swings about a horizontal axis. A spout at the rear of the saw carries off the dust. A permanent gage for positioning the work is secured on the stationary bed. The swiveling table can be locked in any position, and the saw at any height.

Screw-Plate, Set No. 3.0
Frank O. Wells Co., Inc., Greenfield, Mass.
"American Machinist," March 30, 1922.



The stock for holding the dies is made of an aluminum alloy. The dies are all of hexagon shape, adjustable to size by turning a fillister-head screw fitted in the side of the die. The die stock is provided with an adjustable guide held in place by two knurled-head screws. When the screws are loosened slightly, the guide can be swung to one side so that the dies can be changed. The set includes eight dies from ¼ to ¾ in. in size, in both U.S.S. and S.A.E. threads. There are eight U.S.S. taper taps and eight S.A.E. plug taps. The complete set is packed in a wooden case.

Clip, paste on 3 x 5-in. cards and file as desired

Personals

HENRY R. COBLEIGH has been made secretary of the service committee of the National Automobile Chamber of Commerce. One of Mr. Cobleigh's most important duties will be in connection with the joint committee of the chamber and the Society of Automotive Engineers on simplified practice. The joint committee is working with the Department of Commerce to establish automotive standards throughout the industry.

A. A. THORSELL, for some time past connected with the engineering department of the Rockford Machine Tool Co., Rockford, Ill., has been promoted to the office of sales manager of that company with headquarters at Rockford.

H. B. HARPER of the Studebaker Corporation has been appointed a member of the simplified practice committee of the National Automobile Chamber of Commerce. This committee will work with a similar committee from the Society of Automotive Engineers and the Division of Simplified Practice of the Department of Commerce to establish automotive standards.

J. W. ROBINSON will succeed C. E. Allen as manager of the central station division of the Chicago office, Westinghouse Electric and Manufacturing Co.

EDGAR D. MASON has resigned his position as assistant sales manager of the Transcontinental Oil Co., and will resume his practice as consulting sales and advertising counsel, making his headquarters with the Albert P. Hill Co., Inc., Pittsburgh, Pa.

F. R. KOHNSTAMM has been appointed acting manager of the appliance section of the merchandising department of Westinghouse Electric and Manufacturing Co. and will be located in Mansfield, Ohio.

R. W. MORTON, for the past twenty-five years connected with the Fulton Iron Works, St. Louis, Mo., in various capacities, has recently resigned as shop superintendent.

H. A. LYNETTE has been appointed syndicate representative of the central station division of the Chicago office, Westinghouse Electric and Manufacturing Co.

L. H. BLOOM of the Hart-Parr Co., Charles City, Iowa, has been promoted to the office of general sales manager of the company to succeed Walter I. Frederickson, resigned.

G. A. SACCHI, formerly manager of the stoker section of the power department, Westinghouse Electric and Manufacturing Co., has been appointed manager of stoker sales and will have his headquarters at South Philadelphia.

G. F. SHERRATT has been appointed manager of the Pittsburgh sales office of the Chain Belt Co., Milwaukee, with headquarters in the Union Arcade Building, Pittsburgh, Pa.

LEONARD BONNER has just been appointed to the position of district manager for the Great Western Smelting and Refining Co., with headquarters at Pittsburgh, Pa.

C. C. CURRY, formerly branch manager of the Minneapolis office, Westinghouse Electric and Manufacturing Co., has been assigned to special work in connection with the St. Paul Electric Company.

CHARLES M. SCHWAB, it is announced, has been elected chairman of the board of directors of the Chicago Pneumatic Tool Co., to succeed John R. McGinley, resigned.

M. C. RYPINSKI of the radio sales division, Westinghouse Electric and Manufacturing Co., has transferred his headquarters to New York as a branch of the headquarters sales department.

WALTER S. FREDERICKSON, until recently connected with the Hart-Parr Co., Charles City, Iowa, has been appointed sales manger of the Auburn Motor Co., Auburn, Ind.

A. HECKMAN is now works electrical engineer for the East Pittsburgh works of the Westinghouse Electric and Manufacturing Co.

S. R. SHAVE has been appointed manager of the price section of the power and railway departments, Westinghouse Electric and Manufacturing Co., East Pittsburgh.

CLYDE L. KING, president of the Atlanta Plow Co., and the King Implement Co., of Atlanta, Ga., sailed for Europe on June 14 for a three months' business trip.

R. B. MILDON has been appointed general manager of the stoker department, Westinghouse Electric and Manufacturing Co., with headquarters at South Philadelphia.

EDGAR WOODROW has been appointed manager of the contract division of the stoker department, Westinghouse Electric and Manufacturing Co.

Pamphlets Received

Pump Industry Standards. The Hydraulic Society, 50 Church St., New York City. A twenty-page pamphlet on the subject of standards in the pump industry, prepared by the society as a guide for buyers and sellers and containing definitions of terms in common usage in the industry. Copies may be had upon application to the secretary of the society, C. H. Rohrbach.

Paint for Steel. American Chemical Paint Co., New York City. Bulletin No. 10 containing directions for preparing steel for painting and for the use of deoxidine, manufactured by this company.

Carbon-Monoxide Poisoning. U. S. Bureau of Labor Bulletin No. 291, by Alice Hamilton, M. D., containing information relative to carbon-monoxide poisoning in the steel, coal, smelting and printing industries. Distributed by U. S. Department of Labor.

Workmen's Compensation. U. S. Department of Labor Bulletin No. 301, entitled "Comparison of Workmen's Compensation Insurance and Administration," by Carl Hookstadt, distributed by the U. S. Department of Labor.

Educational Bulletin. Institute of Technology, Pasadena, Cal. Bulletin No. 93, containing general information regarding the institute and complete descriptive matter relative to courses and subjects.

Sulphur in Coal Beds. University of Illinois, Urbana, Ill. Bulletin No. 125, entitled "The Distribution of the Forms of Sulphur in the Coal Bed," by H. F. Yancey and Thomas Fraser, prepared under the cooperative agreement between the U. S. Bureau of Mines and the engineering experiment station of the University of Illinois.

Trade Catalogs

Automatic Feeds. F. J. Littell Machine Co., 4125 Ravenswood Ave., Chicago, Ill. Annual catalog of the Littell company describing a line of automatic feeds built to fit all makes and sizes of punches, brushes and special machinery.

Ball and Roller Bearings. Compagnie d'Applications Mecaniques, 15 Avenue de la Grande Armee, Paris, France, represented by the Golden Company, 405 Lexington Ave., New York City. A twenty-page catalog in the French language describing the R-B-F type of ball bearing for which the Golden Company are sales agents in America. The catalog contains also technical data and load calculations.

Automobile Repair Tools. K. R. Wilson, 10 Lock St., Buffalo, N. Y. A booklet of thirty-two pages, designed for the garageman, containing descriptions of various tools and accessories for use in repairing automobile bearings, pistons, crankshafts, etc.

Thermaload Starter. Monitor Controller Co., Baltimore, Md. A circular descriptive of the themaload starters manufactured by this company for either momentary contact or maintained contact pilot control.

Spiral Pipe. American Spiral Pipe Works, Chicago, Ill. A wall circular with numerous illustrations of the uses of spiral pipe on one side, and blue prints of the many styles of fittings on the reverse side.

Chain Furnace Screens. E. J. Codd Co., 700 South Caroline St., Baltimore, Md. An eight-page bulletin descriptive of the Weigand chain furnace screens for furnaces and ovens.

Heating Specialties. The Fulton Co., Knoxville, Tenn. General catalog No. 100, covering the Sylphon line of heating specialties, comprising valves, temperature and pressure regulators made by this company.

Bolt and Hub Machinery. Pawtucket Manufacturing Co., Pawtucket, R. I. A bulletin of twenty-three pages, containing illustrations and specifications pertaining to the numerous sizes of cold-punched nut presses made by this company for the production of square and hexagon U. S. Standard nuts; a twelve-page bulletin descriptive of various sizes of bolt forging machines; a twelve-page bulletin containing data and illustrations on several sizes of bar, lever and cutting shears; a four-page circular describing the two sizes of Knowles key-seating machines.

Electrically Driven Tools. James Clark, Jr., Electric Co., Louisville, Ky. Catalog No. 28, containing descriptive matter, cuts and specifications on the line of electrically driven portable hand drills and grinders, sensitive bench drills and tool grinders.

Condensite. Condensite Company of America, Bloomfield, N. J. A descriptive bulletin containing information regarding the properties of condensite and illustrating the many uses of the material as applied to the automotive industry.

Optical Pyrometers. Scientific Materials Co., Pittsburgh, Pa. A fifteen-page bulletin describing optical pyrometers and containing technical data on the general theory of optical pyrometry as well as instructions for operating the instruments.

Snap Gages. Meldrum-Gabrielson Corporation, Syracuse, N. Y. Catalog and price list No. 4 covering the various sizes of Syracuse adjustable limit snap gages made by this company.

Forthcoming Meetings

Association of Iron and Steel Electrical Engineers. Annual convention, Sept. 11 to 15 at the new auditorium, Cleveland, Ohio. Secretary, John F. Kelly, Empire Building, Pittsburgh, Pa.

American Society for Steel Treating. Exposition and convention at the General Motors Co. building, Detroit, Oct. 2 to 7. W. H. Eisenman, 4,600 Prospect Ave., Cleveland, is secretary.

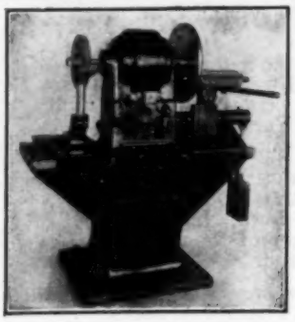
American Manufacturers Export Association annual convention, New York City, Oct. 25 and 26. Secretary, M. B. Dean, 160 Broadway, New York City.

National Founders Association, Nov. 22 and 23. Secretary, J. M. Taylor, 29 South La Salle St., Chicago, Ill.

Condensed-Clipping Index of Equipment

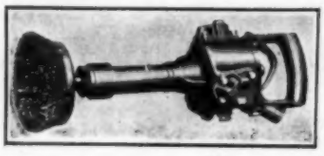
Patented Aug. 20, 1918

Grinding Machine, Combination, No. 2
Badger Tool Co., Beloit, Wis.
"American Machinist," March 30, 1922.



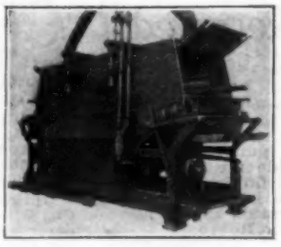
While various forms of equipment are adaptable to the machine, it is here shown equipped with a 16-in. disk wheel and a universal lever-feed table. The left end of the spindle is extended to receive a 12-in. solid grinding wheel fitted with an adjustable work rest. The 3-hp. G.E. motor is fitted with special end frames. It is fully enclosed, has forced ventilation, and is controlled by push button and automatic starter. Weight, 1,300 pounds.

Brush, Wire, Air-Driven, "Little David," No. 601
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
"American Machinist," March 30, 1922.



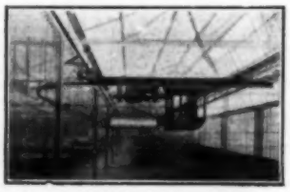
The tool is especially intended for removing paint, rust, dirt and scale from tanks, cars and structural steel forms. It differs from the former model in its high rotating speed and larger brush. The air motor is of the three-cylinder type. The average free speed of the brush when operating on 90 lb. per sq. in. air pressure is 4,200 r.p.m. Brush diameter, 6 in. Length overall, 17½ in. Weight, 14 pounds.

Washing Machine, Metal-Parts, "Autosan"
Colt's Patent Fire Arms Manufacturing Co., Hartford, Conn.
"American Machinist," March 30, 1922.



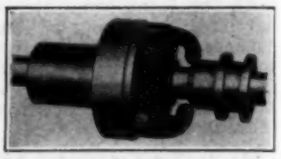
The machine is used to cleanse screw-machine products and other parts not exceeding 20 in. in width and 14 in. in height. A linked conveyor belt passes through the cleansing chamber and over drums at the ends, and is driven at a constant slow rate of travel by the 2-hp. motor. In the cleansing chamber, the work passes through two separate series of sprays forcibly ejected through small nozzles by a powerful rotary pump that is a part of the machine. Speed of travel can be varied from 10 to 17 ft. per minute. The machine is shown equipped with two sets of sprays. Floor space, 116 x 44 in. Height, 61 in. Weight, 2,700 pounds.

Crane, Hand or Electric, Tramrail
Cleveland Crane and Engineering Co., Wickliffe, Ohio.
"American Machinist," March 30, 1922.



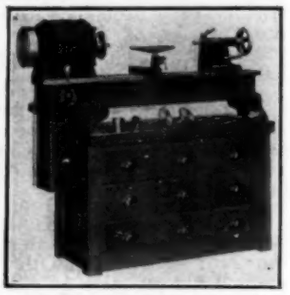
This light-weight crane with a maximum capacity of two tons, acts primarily as a feeder or supply crane to the regular Tramrail system in the stockroom or other depots. It consists of an I-beam suspended at each end from the bottom of two cast-steel carriers, which in turn are suspended in the wheel yoke hangers. The motion of the wheels can be operated electrically by cab or floor control, or the whole unit can be pushed by hand. The hoist can climb inclines up to 12½ deg. The type of work carrier depends on the materials to be handled, the size or length of the system, and the total floor area served.

Clutch, Friction, Extended-Sleeve
L. W. Carroll Manufacturing Co., Batavia, Ohio.
"American Machinist," March 30, 1922.



The clutch can be used in driving wood, steel or cast-iron pulleys, gears, sprocket wheels or such parts placed on the sleeve. It can be erected by merely sliding it on the shaft and tightening one screw. The friction disk has a large diameter. The spider is keyed to the shaft, or held by a hollow setscrew. The friction is adjusted by turning one nut, which automatically adjusts the tension for both of the fingers. The clutch may be placed on the line shaft, driving directly to the machine. It is furnished in six sizes, from 5 to 12 in. in diameter. At 100 r.p.m., the horsepower transmitted is 2 to 13, depending on the size.

Lathe, Speed, Motor Headstock, A. C., 12-In.
J. G. Blount Co., Everett, Mass.
"American Machinist," March 30, 1922.

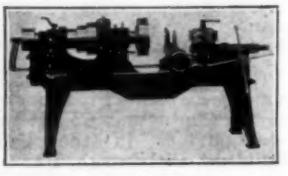


The lathe is used especially for wood turning in manual training schools and in pattern shops. A ½-hp. a.c. motor is mounted directly on the spindle of the headstock. Short legs for bench use are ordinarily fastened to the bed, or long legs for supporting the bed from the floor can be supplied. The speed of the motor is changed by a hand lever at the front. Bed length, 4, 5 or 6 ft. Distance between centers, 25, 35 and 49 in. Speeds, 575, 1,160, 1,750 and 3,450 r.p.m. Equipment: one spur and one cup center, three T-rests, 5½-in. faceplate, 3-in. screw chuck, knockout rod for head center and one right-angled rest.

Truck, Factory, Drop-Frame, Low-Platform, Electric
Elwell-Parker Electric Co., Cleveland, Ohio.
"American Machinist," March 30, 1922.

The truck is intended for handling barrels, bales and heavy material. A very low platform is the chief feature. Housings are placed over the rear or trailing wheels, which carry rubber tires 10½ in. in diameter and 5 in. wide. The driving wheels have tires 21½ x 3½ in. in size. Steering is accomplished with all four wheels. The storage battery is carried on the upper deck at the front of the truck, with the motor and worm drive axle below it. The truck travels from 15 to 20 miles on a single charge of the battery.

Lathe, Turret, Gap
Acme Machine Tool Co., Cincinnati, Ohio.
"American Machinist," March 30, 1922.



The lathe has all the regular dimensions of the 20-in. Cincinnati Acme turret lathe, excepting that the gap provides for a maximum swing over the bed of 28 in. The length of the gap from the end of the spindle is 9½ in. The machine is equipped with an air chuck, power feed for the cross travel of the cut-off rest, and power feed for the longitudinal travel of the turret. The arrangement of these feeds can be furnished as desired.

Clip, paste on 3 x 5-in. cards and file as desired

New and Enlarged Shops

Machine Tools Wanted

Cal., San Francisco—L. R. Lurie, Mills Bldg.—equipment for proposed machine shop.

Kan., Wichita—E. J. Drake, 253 North Market St., cabinet maker—wood lathe.

La., Shreveport—Cunningham Mch. Wks., L. T. Cunningham, Genl. Mgr.—machine tools and equipment for proposed factory for manufacture of acetylene equipment.

Mich., Munising—School Bd., T. W. Scholtes, Secy.—lathes, woodturning machinery, blacksmith shop equipment, for manual arts.

Mo., Kansas City—Kansas City Second Hand Box Co., 32 Ewing St.—one power planer,

Mo., St. Charles—F. Reinert, 314 South 2nd St.—power lathe and drill press.

N. J., Newark—Kreuter & Co., Inc., 583 18th Ave.—double disc grinder with counter-shaft, etc., complete.

N. Y., Buffalo—Peckham Vocational School, 321 Peckham St.—equipment for machine and woodworking shops.

N. Y., Buffalo—F. L. Whitney, 390 Ontario St.—tools and equipment for the repair of automobiles, also a 1,000 gal. gasoline tank.

N. Y., New York—J. Spengler, 229 West 28th St.—electric drill (Universal).

N. Y., New York—Thomsen & Co., 90 Wall St.—four Universal type radial drilling machines with 6 ft. arm.

O., Columbus—Arch City Machine Wks., 969 North Market St., C. L. Mahnick—grinders, lathe, press, shapers, etc., for machine works.

O., Columbus—Lawwell-McLeish Co., 241 N. 4th St.—lathe, drill press, grinder and milling machine for garage and service station.

O., Columbus—Lloyd-Hoffman Co., 1148 Mt. Vernon Ave., E. Lloyd, Purch. Agt.—one drill press, air compressor, and electric motor 15 or 20 hp.

Pa., Beaver Falls—Brighton Electric Steel Casting Co., E. D. Townsend—machinery and equipment for proposed shop for manufacture of iron, steel, brass and other castings.

Pa., New Castle—D. E. Frew—machinery and equipment for proposed shop, to manufacture metal shipping containers.

Pa., Sharon—G. C. Cross—machine tools, equipment, etc., for gas filling and service station on South Dock St. (now under construction).

Pa., Warren—City Taxi Co., R. Norris, Mgr.—machinery, tools and equipment for proposed service garage.

Va., Alexandria—Mt. Vernon Garage, 113 North St. Asaph St., J. Benton, Secy.—equipment and small tools for machine shop.

Wis., Milwaukee—V. Zillig, 1202 Chestnut St., manufacturer of special tools and machinery—lathe, drill presses, die room equipment.

Wis., Milwaukee—M. Zwoster, 708 National Ave.—drill press, air compressor, gasoline tank and pump for auto repair shop.

Que., Montreal—A. Ducas, 526 Ontario St. W.—small tools, grinder, etc. for garage and automobile repair shop.

Que., Montreal—J. Mathieu, 100 Rose de Lima St.—small lathe and general equipment for automobile repair.

Machinery Wanted

Cal., Fairoaks—Fairoaks Fruit Co., W. Hinsel, Genl. Mgr.—additional machinery for handling olives.

Cal., Haywood—A. La Cunha—machinery and equipment for proposed soap manufacturing plant.

Cal., Los Angeles—Joart Electric Co., Inc., Citizens Natl. Bank Bldg.—machinery and equipment for the manufacture of washing machines.

Ga., Macon—C. O. Carpenter, c/o 4th Natl. Bank—machinery and equipment for the manufacture of brooms and mattresses for proposed plant (new or used).

Kan., Grainfield—Cap Sheaf, F. J. Wolfe, Purch. Agt.—linotype machine and printing equipment for Junior linotype.

Kan., Wichita — Western Newspaper Union, 525 East William St., H. W. Albright, Mgr.—one 7 column quarto cylinder press, and one linotype machine.

Kan., Wichita—Wichita Beacon, North Main St., H. J. Allen, Purch. Agt.—one newspaper press.

Kan., Wichita—Wichita Eagle, Market and William Sts., M. Murdock, Purch. Agt.—linotype machine for setting large newspaper heads and newspaper press.

Md., Hagerstown—Oakol Mfg. Co., c/o G. H. Stevenson, Dir.—machinery and equipment for the manufacture of fuel from the garbage supply of Hagerstown.

Mich., Midland—E. Mills—new machinery and equipment for remodeled foundry at Saginaw.

Mich., Plymouth—Detroit House of Correction, 1441 Alfred St., Detroit, J. O. Stutzman, Supt.—dry kilns and equipment, also woodworking machinery for proposed industrial building.

Minn., Cloquet—Northwest Paper Co.—one traveling crane.

Neb., Lincoln—Capital Bindery, 315 South 11th St., F. Reger, Purch. Agt.—power paper punching machine for loose leaf sheets (used).

Nev., Eureka—Holly Consolidated Mining Co.—equipment for proposed large flotation plant.

N. Y., Buffalo—E. Kubik, 960 Grant St.—machinery and equipment for bakery.

N. Y., Geneva—Geneva Brick Products Corp., R. A. Catchpoll, Dir.—machinery and equipment for the manufacture of brick, tile and roofing materials.

N. Y., Niagara Falls—New Goodyear Shoe Repairing Co., L. Scozzafana and T. Zagordi—machinery and equipment for shoe repairing.

N. C., Newland—T. J. Ray—electrically operated machinery and equipment for the manufacture of ice cream and ice (new or used).

N. C., Winston-Salem—J. Reich—machinery for proposed paint manufacturing plant.

O., Dayton—Bd. of Governors, Natl. Homes for Disabled Volunteer Soldiers, Genl. Headquarters, G. H. Wood, Pres.—ice making machinery, 25 ton capacity, for home in Wisconsin.

O., Winton Place (Cincinnati P. O.)—The Cincinnati Car Co., J. H. Elliott, Mgr.—one 500 ft., two stage, belt driven air compressor, one 30 in. table travel milling machine, 4 electric arc welders, 1 large size, belt driven blacksmith hammer, one warehouse shear for cutting rounds, squares, angles and channels.

Okla., Pawhuska—Amis & Nolan, Oil Products—steam drill runners.

Pa., Downington—Bd. of Educ., c/o Secy.—woodworking machinery for vocational department in new high school.

Pa., Franklin—Atlantic Refining Co.—equipment for proposed addition.

Pa., Phila.—F. H. Hosback, 2415 South St.—tenoning machines, planers, saws, etc., for woodworking and furniture manufacturing.

Pa., Phila.—J. F. Nolan & Sons, Church Lanne—vats, dryers, etc., for dye house.

Tenn., Chattanooga—M. B. Parker, 1912 Oak St., manufacturer of machinery, etc.—one belted air compressor (150-250 ft. capacity), one 36 in. gauge locomotive (used).

Wis., Delavan—The State Bd. of Control, Capitol, Madison, M. J. Tappins, Secy.—machinery and equipment for proposed laundry for state school for deaf.

Wis., Ingram—Hintz Bros.—saw mill machinery, belting, shafting, hangers.

Wis., Milwaukee—Milwaukee Co. Bd. of Trustees, W. L. Coffey, Mgr., Wauwatosa, will receive bids until July 13th on refrigeration machinery.

Wis., Mondovi—P. K. Claflin—machinery and equipment for blacksmith shop.

Wis., Oconomowoc—Concord Dairy Products Co., c/o W. Kroll, Route 4—special creamery machinery, belting, etc.

Wis., Sheboygan—Keil Oil Co., c/o W. G. Keil, 1516 North 9th St.—pump, storage tanks, etc., for proposed filling station and garage.

N. S., North Sydney—Cape Breton Cold Storage Co.—machinery and equipment for proposed cold storage plant and packing house.

Ont., Burford—Apps Flour Mills—machinery for flour mills, partially destroyed by fire.

Ont., Ottawa—Stadium of Ottawa, Ltd., 198 Sparks St.—artificial ice plant for proposed large rink.

Ont., Toronto — Toronto Wet Wash Laundry Co., 11 Dundas St., W.—washers, boilers, driers and mangles for proposed laundry.

Ont., Welland—J. Stokes Rubber Co., c/o General Manager—machinery and equipment for the manufacture of radio parts, insulators, telephone receivers, etc.

Metal Working Shops

Cal., Merced—Merced Irrigation District, Shaffer Bldg., will build a 1 story garage and machine shop.

Conn., Hartford—H. A. Sillence, 19 Adelaide St., will soon award the contract for the construction of a 4 story, 50 x 60 ft. garage. Estimated cost $40,000. Toole & Katzenstein, 252 Asylum St., Archts.

Conn., Norwalk—Meeker Union Fdry., 34 Smith St., plans to rebuild its 1 story iron foundry and plant which was recently destroyed by fire. Estimated cost between $25,000 and $40,000. Private plans.

Ind., Michigan City—Sullivan Mchy. Co., 122 South Michigan Ave., and A. S. Coffin, Archt., 39 West Adams St., are receiving bids for the construction of a 2 story, 60 x 400 ft. and a 2 story, 400 x 550 ft. factory. Estimated cost $1,000,000.

Md., Hagerstown—Pennsylvania R.R. Co., 18th and Filbert St., Phila., Pa., has awarded the contract for the construction of a roundhouse and terminal facilities, here. Estimated cost $250,000.

Mass., Boston—Peterboro Realty Trust Co., 18 Tremont St., has awarded the contract for the construction of a 2 story, 75 x 170 ft. garage on Kilmarnock Rd. Estimated cost $70,000. Private plans.

Mass., Lynn—Ravin & Gorden has awarded the contract for the contruction of a 1 story, 79 x 201 ft. garage. Estimated cost $50,000.

Mass., Rockland—H. B. Vesper, 243 Union St., has awarded the contract for the construction of a 1 story, 100 x120 ft. garage and service station on West Water and Union Sts. Estimated cost $40,000.

Mass., Willimansett (Holyoke P. O.)—The Palmer Steel Co., 316 High St., Holyoke, has awarded the contract for the construction of a 1 story, 80 x 329 ft. steel plant, here. Estimated cost $75,000. Private plans. Noted May 4, 1922.

Mich., Ann Arbor—The Bd. of Regents, University of Michigan, has awarded the contract for the construction of a 4 story, 189 x 248 ft. engineering shop. Estimated cost about $700,000.

N. H., Manchester—J. Sullivan, 50 Granite St., will soon award the contract for the construction of a 1 story, 60 x 120 ft. garage, service station and repair shop. Estimated cost $25,000. J. E. Baker, 1008 Elm St., Archt.

The Weekly Price Guide

RISE AND FALL OF MARKET

Advances—Steel sheets up 10c., cold finished shafting, flats, squares, hexagons, etc., 30c. and tank plates, 17c. per 100 lb. in Cleveland warehouses. Mill price of steel shapes, plates and bars, $1.60@$1.70 per 100 lb., f.o.b. Pittsburgh. Gray iron machinery castings advanced 3c.@3½c. per lb. in Detroit. Copper and brass tubing up ½c. and zinc sheets, in casks, ½c. per lb. in New York. Raw linseed oil quoted in New York at 90c. as against 88c. per gal. in 5 bbl. lots.

Declines—Tin down ½c. and lead ½c. per lb. in New York warehouses. Copper market slack with downward tendency in zinc quotations.

IRON AND STEEL

PIG IRON — Per gross ton — Quotations compiled by The Matthew Addy Co.:

CINCINNATI	
No. 2 Southern	$25.00
Northern Basic	26.52
Southern Ohio No. 2	26.02
NEW YORK—Tidewater Delivery	
Southern No. 2 (silicon 2.25@2.75)	31.16
BIRMINGHAM	
No. 2 Foundry	20.50
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	27.82
Virginia No. 2	29.24
Basic	25.50
Grey Forge	25.50
CHICAGO	
No. 2 Foundry local	24.00
No. 2 Foundry, Southern (silicon 2.25@2.75)	27.17
PITTSBURGH, including freight charge from Valley	
No. 2 Foundry	25.00
Basic	25.00
Bessemer	25.00

IRON MACHINERY CASTINGS—In cents per pound:

	Light	Medium	Heavy
Detroit	10.0	8.0	3.0
New York	9@10	6.0	3.0
Cleveland	6.75	4.5	2.6
Chicago	5.0	4.5	3.5
Cincinnati	6.0	5.0	4.5

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the base quotations from mill:

Blue Annealed	Pittsburgh, Large Mill Lots	New York	Cleveland	Chicago
No. 10	2.40	3.63	3.25	3.63
No. 12	2.45	3.68	3.30	3.68
No. 14	2.50	3.73	3.35	3.73
No. 16	2.70	3.83	3.45	3.83
Black				
Nos. 17 and 21.	3.00	4.15	3.80	4.30
Nos. 22 and 24.	3.05	4.20	3.85	4.30
Nos. 25 and 26.	3.10	4.25	3.90	4.35
No. 28	3.15	4.35	4.00	4.45
Galvanized steel sheets:				
Nos. 10 and 11.	3.15	4.35	3.85	4.45
Nos. 12 and 14.	3.25	4.45	3.95	4.55
Nos. 17 and 21.	3.55	4.75	4.25	4.85
Nos. 22 and 24.	3.70	4.90	4.55	5.00
No. 26	3.85	5.05	4.70	5.15
No. 28	4.15	5.35	5.00	5.45

WROUGHT PIPE—The following discounts are to jobbers for carload lots on the latest Pittsburgh basing card:

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
		BUTT WELD			
1 to 3	71	58½	¾ to 1½	44½	29½
		LAP WELD			
2	64	51½	2	39½	25½
2½ to 6	68	55½	2½ to 4	42½	29½
7 to 8	65	51½	4½ to 6	42½	29½
9 to 12	64	50½	7 to 12	40½	27½
		BUTT WELD, EXTRA STRONG, PLAIN ENDS			
1 to 1½	69	57½	¾ to 1½	44½	30½
2 to 3	70	58½			
		LAP WELD, EXTRA STRONG, PLAIN ENDS			
2	62	50½	2	40½	27½
2½ to 4	66	54½	2½ to 4	43½	31½
4½ to 6	65	53½	4½ to 6	42½	30½
7 to 8	61	47½	7 to 8	35½	23½
9 to 12	55	41½	9 to 12	30½	18½

Malleable fittings. Classes B and C, Banded, from New York stock sell at net list. Cast iron, standard sizes, 20–5% off.

WROUGHT PIPE—Warehouse discounts as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. steel butt welded	66%	53%	60½%	47½%	62½%	48½%
2½ to 6 in. steel lap welded	61%	47%	58½%	44½%	59½%	45½%

Malleable fittings. Classes B and C, Banded, from New York stock sell at list less 10%. Cast iron, standard sizes, 32–5% off.

MISCELLANEOUS—Warehouse prices in cents per pound in 100-lb. lots:

	New York	Cleveland	Chicago
Open hearth spring steel (base)	4.50	6.00	4.50
Spring steel (light) (base)	6@8	6.00	6.00
Coppered Bessemer rods (base)	6.03	8.00	6.85
Hoop steel	3.63	2.81	3.48
Cold rolled strip steel	6.25	8.25	6.15
Floor plates	4.80	4.66	5.08
Cold finished shafting or screw	3.35	3.30	3.40
Cold finished flats, squares	3.85	3.80	3.90
Structural shapes (base)	2.68	2.51	2.68
Soft steel bars (base)	2.58	2.41	2.58
Soft steel bar shapes (base)	2.58	2.41	2.58
Soft steel bands (base)	3.23	3.06	3.23
Tank plates (base)	2.68	2.68	2.38
Bar iron (2.10@2.20 at mill)	2.58	2.21	2.28
Drill rod (from list)	55@60%	55%	50%
Electric welding wire:			
5/32	8.00		12@13
1/8	6.50		11@12
5/32 to 1/4	6.25		10@11

METALS

Current Prices in Cents Per Pound

Copper, electrolytic (up to carlots), New York	14.62½
Tin, 5-ton lots, New York	31.50
Lead (up to carlots), St. Louis, 5.50; New York	6.12½
Zinc (up to carlots), St. Louis, 5.30; New York	6.12½

	New York	Cleveland	Chicago
Aluminum, 98 to 99% ingots, 1-15 ton lots	19.20	20.00	18.00
Antimony (Chinese), ton spot	6.00	7.50	6.25
Copper sheets, base	20.50	21.00	23.00
Copper wire (carlots)	16.00	17.00	16.25
Copper rods (ton lots)	19.00	22.00	19.50
Copper tubing (100-lb. lots)	23.25	24.00	23.00
Brass sheets (100-lb. lots)	16.75	18.00	18.75
Brass tubing (100-lb. lots)	20.50	21.00	20.50

—Shop Materials and Supplies

METALS—Continued

	New York	Cleveland	Chicago
Brass rods (1,000-lb. lots)	14.75	16.00	15.75
Brass wire (carlots)	17.25	17.75	.....
Zinc sheets (casks)	8.25	17.25	15.75
Nickel (ingot and shot), Bayonne, N. J.	36.00	.....	.....
Nickel (electrolytic), Bayonne, N. J.	39.00	.....	.....
Solder (½ and ½), (caselots)	21.00	22.00	20.00
Babbitt metal (fair grade)	24.00	41.50	36.00
Babbitt metal (commercial)	11.00	16.00	9.00

SPECIAL NICKEL AND ALLOYS—Price in cents per lb.

Malleable nickel ingots	45
Malleable nickel sheet bars	47
Hot rolled rods, Grades "A" and "C" (base)	50
Cold drawn rods, Grades "A" and "C" (base)	60
Copper nickel ingots	37
Hot rolled copper nickel rods (base)	45
Manganese nickel hot rolled (base) rods "D"—low manganese	54
Manganese nickel hot rolled (base) rods "D"—high manganese	57

Base price of monel metal in cents per lb., f.o.b. Bayonne, N.J.:

Shot	32.00	Hot rolled machined rods (base)	48.00
Blocks	32.00	Hot rolled rods (base)	40.00
Ingots	38.00	Cold drawn rods (base)	50.00
Sheet bars	40.00	Hot rolled sheets (base)	45.00

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Copper, heavy, and crucible	12.50	11.75	11.50
Copper, heavy, and wire	12.00	11.25	10.50
Copper, light, and bottoms	10.00	9.50	9.75
Lead, heavy	4.75	4.75	4.75
Lead, tea	4.25	3.50	3.75
Brass, heavy	7.00	6.00	....
Brass, light	6.00	5.00	6.00
No. 1 yellow brass turnings	6.50	6.00	6.50
Zinc	3.00	3.00	....

TIN PLATES—American Charcoal Plates—Bright—Cents per lb.

		New York	Cleveland	Chicago
"AAA" Charcoal Melyn Grade:				
IC,	20x28, 112 sheets	20.00	18.25	18.50
IX,	20x28, 112 sheets	23.00	21.00	20.90
"A" Charcoal Allaways Grade:				
IC,	20x28, 112 sheets	17.00	16.00	17.00
IX,	20x28, 112 sheets	20.00	18.75	19.60
Coke Plates, Bright				
Prime, 20x28 in.:				
100-lb.,	112 sheets	12.50	11.00	14.50
IC,	112 sheets	12.80	11.40	14.80
Terne Plate				
Small lots, 8-lb. Coating:				
100-lb.,	14x20	7.00	5.60	7.25
IC,	14x20	7.25	5.85	7.40

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0.07½@$0.10	$0.12	$0.11½
Cotton waste, mixed, per lb.	.055@.09	.09	.08
Wiping cloths, 13½x13½	.....	per M. 50.00	per lb. .10
Wiping cloths, 13½x20½	.....	per M. 55.00	per lb. .13
Sal soda, 100 lb. lots	2.80	2.40	2.65
Roll sulphur, 360 lb. bbl., per 100 lb	2.85	3.25	3.50
Linseed oil, per gal., 5 bbl. lots.	.90	1.07	.96
White lead, dry or in oil	100 lb. kegs.	New York, 12.50	
Red lead, dry	100 lb. kegs.	New York, 12.50	
Red lead, in oil	100 lb. kegs.	New York, 14.00	
Fire clay, per 100 lb. bag		.80	1.00
Coke, prompt furnace, Connellsville	per net ton	$8.00	
Coke, prompt foundry, Connellsville	per net ton	$8.50	

SHOP SUPPLIES

Current Discounts from Standard Lists

	New York	Cleveland	Chicago
Machine Bolts:			
All sizes up to 1x30 in.	50%	5-10%	60%
1½ and 1¼x3 in. up to 12 in.	33⅓%	60%	60-10%
With cold punched sq. nuts	35%	.....	....
With hot pressed hex. nuts up to 1x30 in. (plus std. extra of 10%)	40%	.....	$4.00 off
Button head bolts, with hex. nuts	25%	$3.90 net	.....
Hex. head and hex. nut bolts	30%	.....	65-5%
Lag screws, coach screws	50%	.....	60-5%
Square and hex. head cap screws	70-10%	75%	70-10%
Carriage bolts, up to 1 in. x 30 in.	40%	60%	50-5%
Bolt ends, with hot pressed nuts	50%	.....	55%
Tap bolts, (h.h. plus std. extra of 10%)	10%	.....	.....
Semi-finished nuts ⅜ and larger	65%	70-10%	80%
Case-hardened nuts	60%	.....	.....
Washers, cast iron, ⅛ in., per 100 lb. (net)	$4.50	$3.50	$3.50
Washers, cast iron, ⅜ in. per 100 lb. (net)	3.75	3.50	3.50
Washers, round plate, per 100 lb. Off list	3.50	....	3.50 net
Nuts, hot pressed, sq., per 100 lb. Off list	2.00	3.50	4.00
Nuts, hot pressed, hex., per 100 lb. Off list	2.00	3.50	4.00
Nuts, cold punched, sq., per 100 lb. Off list	2.00	3.50	4.00
Nuts, cold punched, hex., per 100 lb. Off list	2.00	3.50	4.00
Rivets:			
Rivets, 7/16 in. dia. and smaller	60-5%	70%	60-10%
Rivets, tinned	60-5%	70%	4½c. net
Button heads ¾-in., ⅞-in., 1x2 in. to 5 in., per 100 lb (net)	$4.00	$3.25	$3.10
Cone heads, ditto (net)	4.10	3.35	3.20
1½ to 1¾-in. long, all diameters, *EXTRA* per 100 lb	0.25	.....	0.15
⅝ in. diameter *EXTRA*	0.15	.....	0.15
½ in. diameter *EXTRA*	0.50	.....	0.50
1 in. long, and shorter *EXTRA*	0.50	.....	0.50
Longer than 5 in. *EXTRA*	0.25	.....	0.25
Less than 200 lb. *EXTRA*	0.50	.....	0.50
Countersunk heads *EXTRA*	0.35	.....	$3.35 base
Copper rivets	55-5%	50%	50-%
Copper burs	35%	50%	20%

Lard cutting oil (50 gal. bbl.) per gal.	$0.55	$0.50	$0.67½
Machine lubricant, medium-bodied (50 gal. bbl.), per gal.	0.28@0.33	0.35	0.40
Belting—Present discounts from list in fair quantities (½ doz. rolls).			
Leather—List price, New York, per ply, 12-in. wide, per lin.ft., $2.88:			
Medium grade	40-5%	40-10-2½%	50%
Heavy grade	35%	40%	40-5%
Rubber and duck:			
First grade	60-5%	50-10%	40-10%
Second grade	60-10-5%	60-5%	60-5%
Abrasive materials—In sheets 9x11 in.:			
No. 1 grade, per ream of 480 sheets,			
Flint paper	$5.84	$3.85	$6.48
Emery paper	8.80	11.00	8.80
Emery cloth	27.84	32.75	29.48
Flint cloth, regular weight, width 3½ in., No. 1 grade, per 50 yd. roll,	4.50	.....	4.95
Emery discs, 6 in. dia., No. 1 grade, per 100.			
Paper	1.32	.....	1.40
Cloth	3.02	.....	3.20

N. J., Gloucester City—A. W. Grant, Harrison Bldg., Phila., soon receives bids for the construction a 1 and 2 story, 100 x 500 ft. factory, here, for the manufacture of Diesel engines. Estimated cost $500,000. A. W. Akinoff, Harrison Bldg., Phila., Engr.

N. J., Mt. Holly—W. D. Marren has awarded the contract for the construction of a 1 story, 40 x 100 ft. garage. Estimated cost $50,000.

N. Y., Batavia—C. Mancuso & Son, 322 Ellicott St., plan to build a 2 story 81 x 100 ft. garage and salesroom on East Main St. Estimated cost $40,000. Architect not announced.

N. Y., Brooklyn—Buick Motor Co. and Oakland Motor Cars Co., 1733 Bway, New York, has awarded the contract for the construction of a 6 story automobile service building on 11th Ave. between 55th and 56th Sts., here. Private plans.

N. Y., New York—Dept. of Plants and Structures will re-advertise later for bids for the construction of a repair shop, on 16th St. and Ave. C. Former bids withdrawn.

N. Y., New York—North Dock Realty Co., Inc., c/o J. J. Dunnigan, Engr. and Archt., 394 East 150th St., will build a 1 story, 100 x 500 ft. garage on West 49th St.

O., Cleveland—Crucible Steel Castings Co., Canal Rd., is having plans prepared for the construction of a 1 story, foundry on Almira and West 98th Sts. Estimated cost $100,000. W. H. Shepard, Pres. G. S. Rider & Co., Century Bldg., Engrs. and Archts.

O., Cleveland—P. Matzinger & Co., Archts., Caxton Bldg., is receiving bids for the construction of a 3 story 52 x 70 ft. garage and commercial building on Chester and East 20th Sts., for A. Kohn & Sons Investment Co., 2380 Canal Rd. Estimated cost $75,000.

O., Cleveland—The Representative Constr. Co., Hanna Bldg., will build a 1 story, 58 x 160 ft. garage and workshop at 4008 East 89th St. Estimated cost $50,000. Private plans.

O., Cleveland—M. Sobel, 10019 Parkgate Ave., has had plans prepared for the construction of a 1 story, 42 x 120 ft. garage at 2526 Cedar Ave. Estimated cost $40,000 Private plans.

O., Cleveland—F. B. Strawn, 43 The Arcade, is receiving bids for the construction of a 1 story, 70 x 88 ft. garage at 12510 Penobscot Ave. Estimated cost $40,000. E. E. Smith, Williamson Bldg., Archt.

O., Cleveland—Studebaker Corp., 2020 Euclid Ave., will soon award the contract for the construction of a 3 story 140 x 148 ft. service station on East 25th St. near Payne Ave. Estimated cost $250,000. E. J. Murane, sales Dir. W. S. Ferguson Co., 1900 Euclid Ave., Archts.

O., Cleveland—G. H. Thorn, 2104 East 22nd St., has awarded the contract for the construction of a 1 story, 36 x 86 ft. garage and sales room. Estimated cost $40,000.

Pa., Phila.—T. B. Martindale, Broad St. and Allegheny Ave., has awarded the contract for the construction of a 2 story, 100 x 265 ft. sales and service station. Estimated cost $105,000.

Pa., Phila.—Tate Bros., 4854 Lancaster Ave., will soon award the contract for the construction of a 1 story, 40 x 141 ft. garage. Estimated cost $50,000. Private plans.

Pa., Phila.—Traylor Eng. Co., Broad St. and Lehigh Ave., has awarded the contract for the construction of an 8 story, 125 x 205 ft. sales and service station. Private plans.

Pa., Reading—The Reading Knob Wks. plans to build a 1 story, 30 x 50 ft. addition to its metal specialties plant. Estimated cost will exceed $5,000.

R. I., Providence—W. P. Hamblin, Inc., c/o J. W. Foster, Archt., 46 Narragansett St., Springfield, Mass., plans to build a 1 story, 65 x 200 ft. garage and service station, here. Estimated cost $40,000.

Tex., Burkburnett—Bradford Supply Co., 130 Main St., Bradford, Pa., plans to build a large warehouse and machine shop, on a five acre tract of land, here.

W. Va., Bluefield—B. L. Bailey has awarded the contract for the construction of a 4 story, 83 x 121 ft. garage. Estimated cost $40,000.

W. Va., Huntington—C. F. Wilcoxen, 215 9th St., is having plans prepared for the construction of a 1 story, 60 x 125 ft. shop building (sheet metal). Estimated cost $20,000. R. I. Willett, Rolson and Pritchard Bldg., Archt.

W. Va., Wheeling—Trimble & Lutz, 112 19th St., manufacturers of plumbing supplies, have awarded the contract for the construction of a 2 story, 120 x 120 ft. factory addition. Estimated cost $40,000.

Wis., Milwaukee—Sixth St. Garage Co., c/o M. Tullgren & Sons, Archts., 425 East Water St., has awarded the contract for the construction of a 5 story, 100 x 150 ft. garage on 6th St. and Grand Ave. Estimated cost $200,000.

Wis., Sheboygan—Keil Oil Co., c/o W. G. Keil, 1516 North 9th St., plans to build a 1 story, 60 x 90 ft. filling station and garage. Estimated cost $40,000. Architect not selected.

Mex., Coahuila—Amer. Smelting & Refining Co., 120 Bway, New York, will build a plant consisting of several buildings, here, for smelting and refining. Estimated cost $7,000,000. Private plans.

General Manufacturing

Ariz., Morenci—Stargo Mines, Inc., will build a cyanide mill. Estimated cost $75,000.

Cal., Colusa—California Prune and Apricot Growers' Assn., Market and San Antonio Sts., San Jose, has awarded the contract for the construction of a 1½ story cannery, on Cooper's Extension Tract, here. Estimated cost $80,000. Noted June 29.

Conn., Danbury—Tweedy Silk Mills, Inc., East Franklin St., has awarded the contract for the construction of a 1 story, 60 x 120 ft. weave shed, a 1 story, 40 x 60 ft. power house, a 1 story dye house and a 2 story office building. Estimated cost, between $40,000 and $50,000.

Conn., Hartford—R. S. Peck & Co., 26 High St., has awarded the contract for the construction of a 1 story, 100 x 104 ft. printing plant on Franklin Ave. and Bolton St. Estimated cost $40,000.

Conn., Manchester—The Orford Soap Co., Hillard St., plans to build a 2 and 3 story, 73 x 150 ft. addition to its plant. Estimated cost $60,000. Private plans.

Conn., Thompsonville — The Bigelow-Hartford Carpet Co., Tariff St., has awarded the contract for the construction of a 1 story, 111 x 227 ft. jacquard mill, a 1 story, 113 x 145 ft. worsted mill, and a 1 story, 82 x 142 ft. dyehouse. Estimated cost $1,000,000.

Fla., Auburndale — Auburndale Citrus Growers Assn. will soon award the contract for the construction of a 1 story, 80 x 125 ft. citrus packing plant. Estimated cost $25,000. R. Sands, Mgr. H. D. Mendenhall, Lakeland, Archt.

Fla., Jacksonville—Milldale Ice Co., 1010 East Bay St., plans to build an ice manufacturing plant. Estimated cost, including machinery, $35,000. S. S. Simmons, Mgr.

Ga., Macon—Case-Fowler Lumber Co., plans to rebuild its lumber mill destroyed by fire. Estimated cost $70,000. Private plans.

Me., Lisbon Center—Farnsworth Co. has awarded the contract for the construction of a 2 story, 80 x 100 ft. addition to its woolen mill. Estimated cost $25,000.

Me., Pejepscot—Pejepscot Paper Co., Brunswick, plans to build additions to its plant, here. Estimated cost $1,000,000.

Me., Pittsfield—Amer. Woolen Co., Lawrence, Mass., has awarded the contract for the construction of a 3 story, 50 x 90 ft. addition to its woolen mills here. Estimated cost $40,000. Private plans. Noted June 8, 1922.

Mass., Holyoke—Farr Alpaca Co., plans to build a spindle cotton mill. Estimated cost will exceed $40,000. Private plans. Engineer not announced.

Mass., Lawrence—Amer. Woolen Co., 245 State St., Boston, has awarded the contract for the construction of a 6 story, 100 x 500 ft. woolen mill addition to Washington Mills, here. Estimated cost $500,000.

Mass., Lowell—Massachusetts Mohair Plush Co., 122 Western Ave., will build a 2 story 40 x 140 ft. finishing plant addition. Estimated cost $45,000. Private plans.

Mass., Rockland—Rockland Webbing Co., Inc., plans to build a 1 story, 50 x 70 ft. addition to its webbing plant. Estimated cost $18,000. Private plans.

Mass., South Boston (Boston P. O.)—H. Norman, 20 Lawrence Ave., will build a 3 story, 50 x 167 ft. shoe factory, on A St. Estimated cost $75,000.

Mass., Southbridge—Hamilton Woolen Co., Mill St., plans to build a 1 story, 120 x 140 ft. addition to its woolen mill. Estimated cost $60,000. Private plans.

Mich., Plymouth—J. O. Stutzman, Supt. Detroit House of Correction, 1441 Alfred St., Detroit, will receive bids until July 10, for the construction of a 1 and 2 story, 408 x 840 ft. H shaped industrial building, here. A. Kahn, 1000 Marquette Bldg., Detroit, Archt.

Mich., Sault Ste. Marie—The Cadillac Lumber & Chemical Co. will build a 1 story, 93 x 275 ft. and 110 x 116 ft. saw mill. Estimated cost $250,000. Noted June 1, 1922.

Minn., Minneapolis—Bd. of Park Comrs., J. A. Ridgway, Secy., City Hall, has awarded the contract for the construction of a 3 story, 43 x 144 ft. shops and warehouse on Lyndale Farmstead.

Minn., Minneapolis—The Fulton Bag and Cotton Mills, 643 Security Bldg., has awarded the contract for the construction of a 4 story factory and office building on East Hennepin Ave. and Taft St. V. C. Douglas in charge. Estimated cost $230,000.

Minn., Minneapolis—The Western Newspaper Union, 200 North 3rd St., is receiving bids until July 10th for the construction of a 2 story, 46 x 134 ft. printing plant and office building at 316 8th Ave. S. Estimated cost $100,000. A. L. Westernhagen, Mgr. Magney & Tusler, 126 South 9th St., Archts.

N. J., Trenton—Resolute Pottery Co., 3rd St., has awarded the contract for the construction of a 1 story, 40 x 70 ft. pottery. Estimated cost $10,000.

N. C., Cherryville—Carlton Yarn Mill, Inc., has awarded the contract for the construction of an addition to its cotton mill. Estimated cost $100,000.

N. C., Rutherfordton—Peoples Ice & Fuel Co. plans to build and equip an ice manufacturing plant, capacity 15 ton per day. Estimated cost $15,000. R. L. Taylor, Pres. Private plans.

N. C., Spindale—Spinners Processing Co. has awarded the contract for the construction of a 2 story, 137 x 234 ft. spinning mill. Estimated cost $80,000. S. E. Elmore, Treas.

O., Cleveland—Kronheim Furniture Mfg. Co., 2043 East 55th St., is having plans prepared for the construction of a 4 story 56 x 130 ft. factory and warehouse. Estimated cost $75,000. Steffens & Steffens, 1029 Williamson Bldg., Archts.

O., Dayton—Dayton Daily News, 4th and Ludlow Sts., plans to build a 3 story newspaper plant on 4th St. Estimated cost $150,000. Architect not selected.

Okla., Ardmore—Amerada Petroleum Co., 241 Kennedy Bldg., Tulsa, plans to construct a large gasoline extraction plant near here, in the Amerada oil fields. Estimated cost $100,000. W. M. Lovejoy, Mgr.

Pa., Phila.—F. Hosebach, 2415 South St., has awarded the contract for the construction of a 2 story, 64 x 76 ft. woodworking factory, at 12th and Brown Sts.

Tex., Mineral Wells—Great Texas Oil & Refining Co., Fort Worth, is having pains prepared for a refinery here, capacity 1,000 barrels. F. O. Stevenson, c/o owner, Engr.

Vt., Bellows Falls—Monarch Mfg. Co. plans to build a 1 story, 80 x 100 ft. plant for the manufacture of paper. Estimated cost $30,000. Private plans.

W. Va., Parkersburg—Apex Rubber Sundries Co., Citizens Bank Bldg., plans to build a 1 story, 100 x 300 ft. pant for the manufacture of rubber goods. H. H. Cooper, Mgr. Architect not selected.

Wis., Delavan—The State Bd. of Control, Capitol, Madison, will receive bids until July 11th for the construction of a 2 story 75 x 90 ft. laundry, at state school for deaf. Estimated cost, $50,000. M. J. Tappins, Secy. A. Peabody, Capitol, Madison, Archt.

Wis., Merrill—Wiscosin Valley Co., Inc., c/o W. H. Au Buchon, Secy., 400 Mills St., plans to build a 2 story, 50 x 60 ft. factory for the manufacture of excelsior. Estimated cost $40,000. Private plans.

Wis., Racine—H. & M. Body Corp., 603 Center St., is receiving bids for the construction of 1 story dry kilns. Estimated cost $125,000. Private plans.

Wis., Racine—J. Horlick, Route 2, Box 10, Horlicksville (Racine P. O.), has awarded the contract for the construction of a 3 story grist mill. Estimated cost $15,000. Private plans.

Wis., Wautoma—L. Chaimson, c/o Fair Store, plans to build a 1 and 2 story, 50 x 150 ft. feed and grist mill. Estimated cost $50,000. Architect not selected.

Ont., Welland—The St. Thomas Packing Co., Ltd., plans to build a cold storage plant. Estimated cost $50,000.